



STATUTORY DECLARATION

I, Kyoko ABE, of Taiyo Seimei Otsuka Building 3F, 2-25-1, Kitaotsuka, Toshimaku, Tokyo, 170-0004, Japan, do solemnly and sincerely declare as follows:

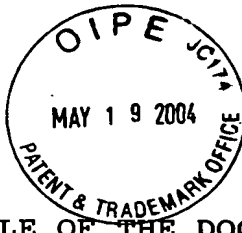
I am well acquainted with the English and Japanese languages.

The attached translation is true into the English language of the accompanying certified copy of the document filed in the name of Fuji Photo Film Co., Ltd., in the Japanese Patent Office on 14 September 2000, in respect to an application for Patent.

This 13th day of May 2004,

Kyoko ABE

Kyoko ABE



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[TITLE] Specification 1

[TITLE] Drawings 1

[TITLE] Abstract 1

[PROOF] Need

[TITLE OF DOCUMENT] Specification

[TITLE OF THE INVENTION] Lens-fitted film unit.

[SCOPE OF CLAIMS]

[CLAIM 1] A lens-fitted film unit comprising a strobe device for emitting strobe light to a subject and a main condenser mounted in said strobe device, and a photo film is preloaded in said lens-fitted film unit,

characterized in providing an automatic diaphragm adjust means for measuring luminance of a subject and adjusting an aperture of a taking lens based on said luminance of a subject, a light receiving means for measuring an amount of said strobe light reflected on said subject, and a control means for stopping said strobe device emitting if said light amount measured by said light receiving means reach a predetermined value.

[CLAIM 2] A lens-fitted film unit claimed in claim 1, characterized in that said automatic diaphragm adjust means determines an aperture as a small diaphragm opening or a large diaphragm opening based on whether said luminance of a subject is higher a predetermined level or not.

[CLAIM 3] A lens-fitted film unit claimed in claim 1 or 2, characterized in that said photo film having film sensitivity of ISO 1600 is used, a diaphragm value of said large diaphragm opening is F8, and a capacity of said main condenser is 80 μ F.

[CLAIM 4] A lens-fitted film unit claimed in claim 1 or 2,

characterized in that said photo film having film sensitivity of ISO 3200 is used, a diaphragm value of said large diaphragm opening is F8, and a capacity of said main condenser is 30 μ F-40 μ F.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[FIELD OF INVENTION]

The present invention relates to a lens-fitted film unit provided with a strobe device and a diaphragm changeover function.

[0002]

[PRIOR ARTS]

The applicant sells a variety of lens-fitted film units as simple cameras, wherein simple photographing mechanisms are mounted and photo films are preloaded. In such lens-fitted film unit, a diaphragms and amounts of strobe light are predetermined by simplifying the structures so as to reduce the cost. Therefore, a range of photographic conditions wherein both main subject such as a person and the background may be photographed appropriately are narrow, and overexposed or underexposed may be occurred depending on the photographing conditions.

[0003]

In order to solve such problems, a variety of lens-fitted film units wherein the diaphragm may be changed. Some of such lens-fitted film unit, for example, measure luminance of the subject and automatically shift a diaphragm plate to change from a large diaphragm to a small diaphragm if the luminance of the

subject is higher than a predetermined level. According to them, overexposed may be prevented when photographing in a place wherein the luminance of the subject is high and enough exposure gained when photographing in a place wherein the luminance of the subject is low.

[0004]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

In the lens-fitted film unit described above, however, a large diaphragm aperture is determined when photographing in a place wherein the luminance of the subject is low, and the main subject may be overexposed when strobe photographing if the camera and the main subject are in a short distance from each other, 1-2m for example. Even if the overexposing is not occurred, since there is a large difference the luminance of the main subject which the strobe light reaches and the background which the strobe light does not reach, the background turns out to be dark as night and the main subject looks as if popping up when printing is executed based on the luminance of the main subject. Accordingly, photographing both the main subject and the background appropriately in a place of low luminance was not possible by using the lens-fitted film unit.

[0005]

An object of the present invention is to provide the lens-fitted film unit wherein the overexposing of the main subject in a short distance may be prevented in strobe photographing and, at the same time, both the main subject and the background may be photographed appropriately.

[0006]

[MEANS FOR SOLVING THE PROBLEMS]

In order to achieve the above object, the lens-fitted film unit of the present invention, wherein a strobe device for emitting a strobe light toward a main subject and a main condenser mounted in the strobe device are provided and a photo film is preloaded, is provided with an automatic diaphragm adjusting means for measuring the luminance of the main subject and for adjusting diaphragm of a taking lens based on the measured luminance, a light receiving means for measuring an amount of the strobe light reflected on the subject, and a strobe control means for stopping the strobe device emitting if the light amount measured by the light receiving means reach a predetermined value.

[0007]

Note that the automatic diaphragm adjusting means may effectively simplify the operation in photographing by determining an aperture as a small diaphragm or a large diaphragm based on whether the luminance of the main subject is higher than a predetermined level.

[0008]

It is preferable that photo film having film sensitivity of ISO 1600 is used, that a diaphragm value of the large diaphragm aperture is F8, and that a capacity of the main condenser is $80\mu\text{F}$.

[0009]

Correspondingly, it is preferable that the photo film having

film sensitivity of ISO 3200 is used, that a diaphragm value of the large diaphragm aperture is F8, and that a capacity of the main condenser is $30\mu\text{F}$ - $40\mu\text{F}$.

[0010]

[EMBODIEMENTS OF THE INVENTION]

Fig.1 shows an appearance of a lens-fitted film unit of the present invention. The lens-fitted film unit is provided with a unit body 10 and an outer label 11 to be wound about the periphery of the unit body 10. A taking lens 12, a finder 13, a strobe emitting part 14, a strobe selecting member 15, a light receiving window 16, and a photometric window 17 are provided in the front side of the unit body 10. On the upper side of the unit body 10, a shutter button 18, a film counter 20, and a charging completion confirmation window 21 are provided and a part of a winding knob 22 is exposed.

[0011]

As shown in Fig.2, the unit body 10 is composed of a main body base part 23, an exposure unit 24, a strobe unit 25, a cartridge body 26, a photo film 27, and a front cover 30 and a rear cover 31 for covering them. The body base part 23 is composed of an exposure frame 32, a cartridge storage chamber 33, and a photo film storage chamber 34. The exposure frame 32 determines an exposure range of the photo film 27. The cartridge storage chamber 32 stores the cartridge body 28, and the cartridge chamber 34 stores a photo film 27 drawn out from the cartridge storage chamber 33 and wound into a roll shape. Note that the photo film 27 in the present invention has film

sensitivity of ISO 1600.

[0012]

The winding knob 22 is attached on the upper side of the cartridge storing chamber 34. A shaft (not shown) provided in the lower part of the winding knob 22 is engaged with a spool 26a formed on the cartridge body 26, and an end of the photo film 27 is held by being nipped in a slit formed on spool 26a. Thereby, if the winding knob 22 rotates counterclockwise in Fig.2, the spool 26a rotates in the same direction correspondingly and, accompanying to it, the photo film 27 shifts to the left side in Fig.2.

[0013]

The front cover 30 is provided in the front side of the body base part 23 and openings to expose the taking lens 12 and the finder 13, the light receiving window 16, and a photometric window 17 are provided thereon. The rear cover 31 is provided in the rear side of the body base part 23 and covers inside the unit body 10 light-tightly with the front cover 30. A pull-top bottom covers 35a and 35b are integrally formed on the rear cover 31 so as to cover inside the cartridge storing chamber 33 and the photo film storing chamber 34 in a light-tight form. The bottom cover 35a is opened when the exposed cartridge body 26 is removed.

[0014]

The strobe unit 25 is disposed beside the exposure unit 24 and composed of the strobe emitting part 14 and a print base plate 36. The strobe emitting part 14 is composed of a discharge

tube for discharge strobe light, a reflector for reflecting the strobe light discharged from the discharge tube toward the subject, a diffusion board for diffusing the strobe light, and the like, and is exposed from the front side of the unit body 10.

[0015]

A main condenser 37, a metal armature 39 for connecting a battery 38 to a strobe circuit, a synchro-switch 40 for turning on when the shutter button 18 is pressed, a charge switch 41 being turned on/off according to the up and down slide operation of the strobe selecting member 15, a photometric element 42, and a light receiving element 43 are mounted on the print base plate 36. The photometric element 42 and the light receiving element 43 face the photometric window 16 and the light receiving window 17 of the unit body 10 respectively. Note that the capacity of the main condenser 37 is $80\mu\text{F}$ and the distance for the strobe light to reach the main subject is about 5m.

[0016]

A variety of electric parts are attached of the print base plate 36, and an auto-strobe circuit 50 and a photometric circuit described later are formed thereon. As shown in Fig.3, the auto-strobe circuit 50 is composed of the charge switch 41, a boosting circuit 52, the strobe emitting part 14, a trigger circuit 53, the synchro-switch 40 and a light emitting amount control circuit 54. When the charge switch 41 is on, the boosting circuit 52 starts operation and boosts electrical current supplied from the battery 38 for driving the strobe to charge

the main condenser 37 for light emitting and a trigger condenser for triggering. When the main condenser 37 reaches a specific charging level, a LED provided in the charging completion confirmation window 21 blinks.

[0017]

When a shutter release is executed after the charging completed, the synchro-switch is on and the trigger circuit 53 is activated to discharge the trigger condenser. Thereby, trigger voltage is applied to a strobe discharge tube 61 (see Fig.4) of the strobe emitting part 14 and the main condenser 37 is discharged through the strobe discharge tube 61, and that emits strobe light. The strobe light discharged from the strobe discharging tube 61 is reflected on the reflector and diffused by the diffusion board to emit the subject. The strobe light discharged from the strobe emitting part 14 is reflected on the subject then enters the light receiving window 17 and, simultaneously, the light receiving element 43 receives the reflected strobe light to adjust the strobe light amount.

[0018]

Fig.4 shows the light emitting amount control circuit 54. The light emitting amount control circuit 54 is composed of a sense amplifier operation voltage generating circuit 55, a light receiving part 56, an on voltage generating circuit 57, a three-terminal thyristor (SCR) 58, a condenser 59, a switching unit 60, and the like. The light emitting amount control circuit 54 is connected only to the both terminals of the main condenser 37 in parallel condition with the strobe discharging tube 61

with centering the main condenser 37 between them.

[0019]

The sense amplifier operation voltage generating circuit 55 is composed of a condenser 55a, a resistance 55b, and a Zener diode 55c, connected in series with each other between the terminals of the main condenser 37. Note that the connecting direction of the Zener diode 55c is a direction wherein the cathode of it is connected to a terminal by a rectifying diode (not shown) of the main condenser 37.

[0020]

The condenser 55a is charged by output current from the boosting circuit 52 as the main condenser 37 is charged. The condenser 55a is charged to the same charging voltage as the main condenser 37 with lowering electric potential in the anode side of the Zener diode 55c. When the main condenser 37 starts discharging via the strobe discharging tube 61, the condenser 55a discharges through the strobe discharging tube 61, the Zener diode 55c, and the resistance 55b. In this time, the condenser 55a discharges into a direction wherein a Zener current is sent to the Zener diode 55c.

[0021]

The Zener diode 55c having about 6V of the Zener voltage is applied and, while the condenser 55a is discharging, both ends of anode and cathode generate the same voltage as the Zener voltage. As for the voltage generated in this time, the electric potential in the cathode is higher than that in the anode of the Zener diode 55c. The light emitting amount control circuit

54 is operated by the voltage generated in both ends of the Zener diode 55c.

[0022]

The light receiving part 56 is composed of the light receiving element 43, a condenser 62, and the like. A collector terminal of the light receiving element 43 is connected to the cathode of the Zener diode 55c via a resistance 66. A resistance 63, 64, and the condenser 62 are connected in series with each other between an emitter terminal of the light receiving element 43 and the anode of the Zener diode 55c, and a resistance 65 is connected between the connecting point of the resistance 63 and the resistance 64 and the anode of the Zener diode 55c.

[0023]

A phototransistor, for example, is used as the light receiving element 43 to receive the light reflected on the subject and to flow photoelectric current corresponding to the received light amount. The condenser 62 is charged by the photoelectric current from the light receiving element, and the charging voltage rises higher. That is, the condenser 62 converts the light amount reflected on the subject received by the light receiving element 43 into voltage.

[0024]

The switching unit 60 is composed of transistors 60a and 60b, and a base terminal of the transistor 60a and the collector terminal of the transistor 60b are connected to the connecting points of the resistances 63 and 64 respectively. The collector terminal of the transistor 60a and the base terminal of the

transistor 60b are connected to each other, and the emitter terminal of the transistor 60a is connected to the anode of the Zener diode 55c. The emitter terminal of the transistor 60b is connected to the cathode of the Zener diode 55c via a resistance 66.

[0025]

In the switching unit 60, each of the transistors 60a and 60b are turned on when the charging voltage of the condenser 62 reaches a standard voltage, and the switching unit 60 it self is turned on. The on of the switching unit is an emitting stop signal. Note that the condenser 60c is provided to prevent the switching unit 60 is turned on by an electrical noise.

[0026]

The on voltage generating circuit 57 is composed of the condenser 57a and the resistance 57b connected in series with each other, and one end of the condenser 57a and one end of the resistance 57b are connected to the anode of the Zener diode 55c and the cathode of the Zener diode 55c respectively. The condenser 57a is charged by the current flown via the resistance 57b by the voltage generated in both ends of the Zener diode 55c. When the switching unit 60 is on, the condenser 57a discharges through the resistance 57b, the resistance 66, and the switching unit 60 and, in this time, a gate voltage is generated to turn on the thyristor 58 between the terminals of the resistance 57b.

[0027]

A gate and the cathode of the thyristor 58 are connected

to the both ends of the resistance 57b, and the anode of the thyristor 58 is connected to the terminal of the main condenser 37 in the base terminal side of oscillating transistor (not shown) of the via the resistance 67. That is, the charging voltage of the main condenser 37 is applied to between the anode and cathode of the thyristor 58, and the voltage between the terminals of the resistance 57b generated as the condenser 57a discharges is applied to between the gate and the cathode 7b.

[0028]

The thyristor 58 is turned on as the gate voltage is applied, and conducts its anode and cathode. by the conduct of the thyristor 58, the main condenser 37 discharges via the thyristor 58 of impedance lower than the strobe discharge tube 61, and the voltage between electrodes of the strobe discharge tube 61 becomes lower than a discharging maintenance voltage and the main condenser 37 stops discharging, then the strobe emitting is stopped. The thyristor 58 is turned off when the charging voltage of the main condenser 37 drops to a predetermined voltage.

[0029]

Note that, though the condenser 57a is charged by the voltage generated in both ends of the Zener diode 55c, it is not charged instantaneously, as it is charged via the resistance 57b. Additionally, in order to turn on the thyristor 58, it is required that the condenser 57a is charged by the charging voltage wherein an enough gate voltage to turn on the thyristor 58 may be gained between the terminals of the resistance 57b,

as the switching unit 60 is turned on. However, if the taking distance to the main subject is short or if the reflectance of the subject is high, the switching unit 60 is sometimes turned on before the condenser 57a reaches the charging voltage to gain the gate voltage, as the strobe light reflected on the subject is strong.

[0030]

In order to prevent a disadvantage described above, the light emitting amount control circuit 54 is provided with the condenser 59 lowering the function of the light receiving part 56 only for a predetermined time immediately after the strobe light emitting is started. The condenser 59 is connected between the connecting point of the resistance 66 and the light receiving element 43 and the anode of the Zener diode 55c, and charged via the resistance 66 by the voltage generated between the terminals of the Zener diode 55c. That is, the condenser 59 is connected in parallel with the light receiving part 56 such that the same voltage as the voltage (charging voltage) generated in both ends of the condenser 59 becomes operating voltage for the light receiving part 56.

[0031]

The charging voltage for the condenser 59 rises gradually immediately after the strobe emitting is started, and the condenser 59 is fully charged after a predetermined time to be a voltage generated in both ends of the Zener diode 55c, that is, the original operating voltage to operate the light receiving part 56. Thereby, the function of the light receiving

part 56 is lowered as the operating voltage given to the light receiving part 56 is lowered before the predetermined time passes immediately after the strobe emitting is started. In particular, the function of the light receiving part 56 is lowered by that the current flowing to the light receiving element 43 is reduced comparing to the original operating voltage given to the light receiving part 56 so as to delay for the condenser 62 to reach the standard voltage, and such that the condenser 57a is charged to the charging voltage at least enough to turn on the thyristor 58.

[0032]

Note that, for convenience, though the condenser 59 is provided to lower the function of the light receiving part 56 for only the predetermined time immediately after the strobe light emitting is started, both the resistance 66 and the condenser 59 actually lower the function of the light receiving part 56, as will be appreciated from the foregoing explanation. The time to lower the function of the light receiving part 56 may be adjusted by the electrostatic capacity of the condenser 59 and the resistance value of the resistance 66, and determined based on the gate voltage required to turn on the thyristor 58, the electrostatic capacity of the condenser 57a, and the resistance value of the resistance 57b. For example, raising the resistance value of the resistance 66 prolongs the time for lowering the function. Note that since the resistance 66 limit the current discharged by the condenser 57a to the gate of the thyristor 58 and, additionally, the resistance 57b and the

resistance 66 limit the gate voltage, the resistance value of the resistance 66 needs to be selected with considering those conditions.

[0033]

The exposure unit 24 is mounted on the front side of the body base part 23. As shown in Fig.5, the exposure unit 24 is composed of a dark box 70, a shutter cover 71, a shutter blade 72, a diaphragm plate 73, and an electromagnet 74. A shutter opening for guiding a subject light toward inside the exposure frame 32 is formed in the center of the dark box 70, and a finder 13, a shutter lever 76, and the like are attached to the upper part of the dark box 70.

[0034]

The shutter blade 72 is provided in front of the dark box 70 and rotates around a hole 72a provided at an end thereof. The shutter blade 72 is held in a position to cover the shutter opening 75 by a bias of a spring 80. A protrusion 72b is provided in the upper end of the shutter blade 72 such that the shutter lever 76 kicks the protrusion 72b to release the shutter opening 75 as the shutter button 18 is pressed. Then, the shutter blade 72 is returned to the original position by the bias of the spring 80, and the unexposed photo film 27 is exposed. The opening and closing time of the shutter blade, a shutter speed in other words, is fixed to a certain time set as designed. The shutter speed is set as 1/100 sec in the present embodiment.

[0035]

The diaphragm plate 73 is disposed between the dark box 70

and the shutter blade 72, and is rotatable around the hole 73a. A small diaphragm aperture 77 having a small diameter and a large diaphragm aperture 78 having a larger diameter than that of the small diaphragm aperture 77 are formed on the diaphragm plate 73. A stopper 70a is provided to the dark box 70. The diaphragm plate 73 abuts the stopper 70a by the bias of a spring 79 and, thereby, the large diaphragm aperture 78 is held in a position to be disposed on a photographing optical axis. Note that a diaphragm value of the small diaphragm aperture is F16 and a diaphragm value of the large diaphragm aperture is F8 in the present embodiment.

[0036]

The electromagnet 74 is attached to the dark box 70 and connected to a photometric circuit 51. The photometric circuit 51 is formed on the print base plate 36 to compose a automatic diaphragm adjust means. As shown in Fig.6, the photometric circuit 51 is composed of the photometric element 42, the electromagnet 74, a photometric switch 81, a received light signal processing part 82, a luminance level discrimination part 83, and a electromagnet driving part 84.

[0037]

As the photometric element 42, Cds, wherein changes the resistance according to the receiving light amount, is used, for example. The received light signal processing part 82 starts operation as the photometric switch 81 is on, generates a photometric signal from the resistance value of the photometric element 42 changed by the subject luminance, and inputs it to

the luminance level discrimination part 83. A comparator, for example, is used as the luminance level discrimination part 83 to discriminate the subject luminance by comparing the voltage of the photometric signal inputted from the received light signal processing part 82 and the predetermined standard voltage. When discriminating that the subject luminance is high, the luminance level discrimination part 83 inputs driving signals to the electromagnet driving part 84. A transistor, for example, is used as the electromagnet driving part 84, and applies electric current to the electromagnet 74 based on the driving signal inputted from the luminance level discrimination part 83.

[0038]

As shown in Fig.6, an iron piece 73b is attached to an end of the diaphragm plate 73, and suction is generated between the electromagnet 74 and the iron piece 73b to shift the diaphragm plate 73 when electric current is applied to the electromagnet 64. Thereby, the diaphragm plate 73 rotates into a position wherein the small diaphragm aperture 77 is disposed on the photographing optical axis, and the electromagnet 74 and the iron piece 73b contact with each other to stop the diaphragm plate 73.

[0039]

A structure of a shutter mechanism is shown in Fig.7. The shutter mechanism is composed of the shutter lever 76, a delay lever 90, a release lever 91, a governor mechanism 92, a cam 93, and a sprocket 94, and all of them are rotatably attached

to the upper part of the dark box 70.

[0040]

A circular plate provided with a notched aperture 93a and a semicircular protrusion provided under the notched aperture 93a are formed on the cam 93. The notched aperture 93a locks the release lever 91. The protrusion is composed of two stage of a first protrusion 93b in the upper position and a second protrusion 93c in the lower position, and the first protrusion 93b and the second protrusion 93c abut the shutter lever 76 and the delay lever respectively. A shaft of the cam 93 is attached to the sprocket 94 provided inside the dark box 70. Since the sprocket 94 is engaged with a perforation 27a (see Fig.2), the sprocket 94 and the cam 93 rotates counterclockwise in the figure when the winding knob 22 is wound and the photo film 27 is supplied.

[0041]

The shutter lever 76 is composed of a shutter protrusion 76a for kicking a protrusion 72a of the shutter blade 72, a hook 76b abutting the cam 93, a protrusion 76c abutting the delay lever 90. A torsion spring 95 is attached to a cylindrical outer surface formed in the upper part of the shutter lever 76. One end of the torsion spring 95 abuts the shutter lever 76 and the other end abuts the dark box 70 to bias the shutter lever 76 counterclockwise in the figure. When the cam 93 rotates counterclockwise in the figure, the first protrusion 93b and the hook 76b of the shutter lever 76 abut each other, and the shutter lever 76 rotates clockwise against the bias of the

torsion spring 95, then a shutter charge is executed.

[0042]

A gear 90a is formed at an end of the delay lever 90, and the gear 90a is engaged with an escapement wheel 96. A protrusion 90b and an engaging part 90c are provided in the upper side of the delay lever 90. The protrusion 90b abuts the second protrusion 93c of the cam 93, and the engaging part 90c holds the release lever 91. The delay lever 90 is attached by a rivet 97, and a torsion spring 98 is inserted into the shaft of the rivet 97. One end of the torsion spring 98 abuts the protrusion 90b of the delay lever 90, and the other end abuts the dark box 70 to bias the delay lever counterclockwise in the figure. Since the second protrusion 93c pushes the protrusion 90b when the cam 93 rotates counterclockwise in the figure, the delay lever 90 rotates clockwise against the bias of the torsion spring 98.

[0043]

The release lever 91 is composed of a release part 91a, an engaging claw 91b, a winding stop part 91c, and a projection 91d. The torsion spring 99 is attached to the lower part of the release lever 91. One end of the torsion spring 99 abuts the release part 91a and the other part abuts the dark box 70 to bias the release lever 91 clockwise in the figure. The projection 91d of the release lever 91 is disposed so as to abut the engaging part 90c of the delay lever 90. The engaging claw holds the release lever 91 by entering the notched aperture 93a of the cam 93. The winding stop part 91c locks the rotation of the winding knob 22 by engaging with a groove formed around the

winding knob 22 as the release lever 91 rotates clockwise in the figure. The release part 91a is provided to abut the shutter button 18, and the release lever 91 rotates clockwise in the figure against the bias of the torsion spring 99 when the shutter button 18 is pressed, then the engaging of the engaging claw 91b and the notched aperture 93a is released.

[0044]

The governor mechanism 92 is composed of the escapement wheel 96 and an anchor 100. The rotating speed of the escapement wheel 96 is adjusted by the anchor 100. As described in the foregoing, the escapement wheel 96 rotates together with the delay lever 90 by engaging with the gear 90a of the delay lever 90. Thereby, the governor mechanism 92 adjusts the rotating speed of the delay lever 90. The escapement wheel 96 is provided with a sector rib 101. The rib 101 abuts the photometric switch 81 only while the escapement wheel 96 is rotating.

[0045]

As shown in Fig.8, when the winding knob 22 is rotated, the photo film 27 is fed, and the cam 93 rotates counterclockwise in the figure with the sprocket 94. Then, the first protrusion 93b of the cam 93 abuts the hook 78b of the shutter lever 76, and the shutter lever 76 rotates clockwise in the figure to charge. Also, the second protrusion 93c abuts the protrusion 90b of the delay lever 90, and the delay lever 90 rotates clockwise in the figure.

[0046]

As shown in Fig.9, when the delay lever 90 rotates to a

certain amount, the engaging of the engaging part 90c of the delay lever 90 and the projection 91d of the release lever 91 is released. Then, the release lever 91 rotates clockwise and the engaging claw 91b is held by entering inside the notched aperture 93a. In this time, the winding stop part 92c of the release lever 91 engages with teeth at the periphery of the winding knob, and the rotation of the winding knob is locked. Since the projection 91d of the release lever 91 is inserted onto the rotary axis of the engaging part 90c, the delay lever 90 is held in a state wherein the engaging part 90c abuts the projection 91d of the release lever 91. The shutter charge is executed by the foregoing operation. The shutter lever is held in a state wherein the projection 76c abuts one end of the delay lever 90.

[0047]

As shown in Fig.10, when the shutter button 18 is pressed in a state wherein the shutter charge is executed, the release part 91a of the release lever 91 abuts the shutter button 18, and the release lever 91 rotates counterclockwise in the figure against the bias of the torsion spring 99. Thereby, since the projection 91d of the release lever 91 evacuates from the rotary axis of the engaging part 90c of the delay lever 90, the delay lever 90 rotates counterclockwise in the figure by the bias of the torsion spring 96. Accompanying to the rotation of the delay lever 90, the escapement wheel 96 rotates clockwise in the figure. Then, the rib 101 attached to the escapement wheel 96 touches the photometric switch 81, and the photometric switch

81 is turned on and the photometric circuit 51 operates to changeover the diaphragm. In this time, since the shutter lever 76 is kept touching one of the delay lever 90, the shutter lever 76 is held with being charged.

[0048]

When the delay lever 90 rotates to a certain amount, one end of the delay lever 90 evacuates the rotary axis of the projection 76c of the shutter lever 76, and the shutter lever 76 rotates counterclockwise in the figure by the bias of the torsion spring 95. Then, the shutter projection 76a kicks the top part 72b of the shutter blade 72 to expose the photo film 27. The delay lever 90 continues to rotate after that and stop when the rib 101 moves away from the photometric switch 81, and the shutter operation is completed.

[0049]

Note that an interval of the time of starting photometry and the time for the shutter lever 76 to start rotating may be adjusted by changing the rotating speed of the delay lever 90 by means of the governor mechanism 92. The interval is adjusted such that the shutter blade 72 is opened after the changeover of the diaphragm.

[0050]

Next, the function of the above embodiment is explained. In the lens-fitted film unit in a nonuse state, the strobe selecting member 15 is slid to an off position below. First, a photographer rotates the winding knob to wind a frame of the photo film 27. Then, the photographer judges whether there is

a need for strobe emitting.

[0051]

If the photographer judges as there is no need for strobe emitting, the photographer press the shutter button 18, after confirming a photographing area through the finder 13. Thereby, the photometric switch 81 is turned on and the photometric circuit 51 shown in Fig.6 operates. The photometric circuit 51 measures the subject luminance by the photometric element 42, and the received light signal processing part 82 inputs the photometric signal to the luminance level discrimination part 83 based on the resistance value of the photometric element 42. The luminance level discrimination part 83 judges whether the subject luminance is higher than the predetermined level, by comparing the voltage of the photometric signal inputted from the received light signal processing part 82 and the predetermined standard voltage.

[0052]

As shown in Fig.11 (A), if the subject luminance is lower than the predetermined level, since the luminance level discrimination part 83 does not output the driving signal, the electromagnet 74 is not applied voltage, and the large diaphragm aperture 78 is kept being disposed on the photographing optical axis. If the subject luminance is higher than the predetermined level, the luminance level discrimination part 83 inputs the driving signal to the electromagnet driving part 84. When inputted the driving signal from the luminance level discrimination part 83, the electromagnet driving part 84

applies voltage to the electromagnet 74. As shown in Fig.11 (B), if the electromagnet 74 is applied voltage, suction is generated between the electromagnet 74 and the iron piece 73b of the diaphragm plate 73, and the diaphragm plate 73 rotates then the small diaphragm aperture 77 is inserted onto the photographing optical axis. Then, the shutter blade 72 opens and closes, and a photographing is completed.

[0053]

Thus, since the exposure is executed through the large diaphragm aperture 78 when photographing in a location of low subject luminance such as indoor photographing, and the exposure amount rises up, a printed photograph of appropriate exposure may be gained without generating underexposure. On the other hand, when photographing in a location of high subject luminance such as outdoors photographing under fine weather, the exposure is executed through the small diaphragm aperture 77, and photographing may be executed without generating overexposure.

[0054]

If it is judged that the strobe emitting is needed, the photographer operates to slide the strobe selecting member 15 to the upper on position. Thereby, the charging switch 41 of the print base plate 36 is turned on to operate the auto strobe circuit shown in Fig.3. In the auto-strobe circuit, the boosting circuit 52 operates to charge the main condenser 37 and the trigger condenser. When the main condenser 37 completes to be charged, the LED provided in the charging completion

confirmation window blinks to inform the photographer and a person to be photographed of completion of charging.

[0055]

Then, the photographer confirms the photographing area through the finder 13 and presses the shutter button 18. Thereby, the photometric switch 81 is turned on and the photometric circuit 51 operates, and the small diaphragm aperture 77 or the large diaphragm aperture 78 is disposed on the photographing optical axis, as described above. After that, the shutter blade 72 rotates to the opening position to open the shutter opening 75. In this time, the shutter blade 72 rotating toward the opening position is turned on by pressing the synchro-switch 40. The trigger circuit 53 discharges the trigger condenser, and the strobe discharge tube 61 of the strobe emitting part 14 is impressed trigger voltage. The strobe discharge tube 61 executes strobe emitting by discharging of the main condenser 37. The strobe light emitted from the strobe discharge tube 61 is reflected and diffused by the reflector and the diffusion board to emit the subject.

[0056]

The strobe light emitted from the strobe emitting part 14 reflects on the subject and enters the light receiving window 17. The light receiving element 43, mounted in the back of the light receiving window 17, flows photoelectric current based on the received light amount. The light emitting amount control circuit 54 compares the charging voltage of the photoelectric current flowed from the light receiving element 43 and the

standard voltage, and stops strobe emitting when the charging voltage reaches the standard voltage.

[0057]

In this time, since strobe emitting is stopped halfway through the emitting, by the auto strobe circuit 50 if the subject luminance is lower than the predetermined level and the large diaphragm aperture 78 is inserted onto the photographic optical axis, a printed photograph with appropriate exposure may be gained without that the main subject is overexposed in a short distance such as 1-2 m, for example, from the camera to the main subject. Additionally, since the large diaphragm aperture 78 is inserted onto the photographic optical axis, both the main subject and the background may be photographed in an appropriate exposure amount. If the subject luminance is more than the predetermined level, the small diaphragm aperture 77 is inserted onto the photographic optical axis, both the main subject and the background cannot be overexposed.

[0058]

Though the photo film 27 having film sensitivity of ISO 1600 is used in the above embodiment, a photo film having high film sensitivity of ISO 3200 may be also used. If the photo film having film sensitivity of ISO 3200, an exposure condition needs to be changed: when the shutter speed is set to have common 1/100, a diaphragm value of the large diaphragm aperture is set as F8, a diaphragm value of the small diaphragm aperture is set as F22, and a capacity of the main condenser for the strobe is set as $30\mu\text{F}$ - $40\mu\text{F}$, and thereby, it may be prevented that the main

subject in a short distance is overexposed when strobe photographing, and neither excessive overexposure nor underexposure is caused even in photographing without using strobe. In addition, though the diaphragm amount and the sensitivity of the photometric element are changed over by 2 steps, they may be changed over without steps.

[0059]

[EFFECT OF THE INVENTION]

As described above, according to the lens-fitted film unit in the present invention, since the automatic diaphragm adjusting means for measuring the luminance of the main subject and for adjusting diaphragm of the taking lens based on the measured luminance, the light receiving means for measuring an amount of the strobe light reflected on the subject, and a strobe control means for stopping the strobe device emitting if the light amount measured by the light receiving means reach the predetermined value are provided, the subject in a short distance may be prevented from being overexposed as strobe photographing. Additionally, both the main subject and the background may be photographed in an appropriate exposure amount.

[0060]

Since automatic diaphragm adjusting means determines the aperture as the small diaphragm aperture or the large diaphragm aperture according to that whether the subject luminance is higher than the predetermined level, the aperture may be changed over without being accompanied by troublesome operations.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Figure 1]

A perspective view illustrating an appearance of a lens-fitted film unit.

[Figure 2]

A disassembled perspective view illustrating a composition of a unit body.

[Figure 3]

A block view of an auto-strobe circuit.

[Figure 4]

A circuit view of a light emitting amount control circuit.

[Figure 5]

A disassembled perspective view illustrating a composition of an exposure control mechanism.

[Figure 6]

A block view of a photometric circuit.

[Figure 7]

A perspective view illustrating a composition of a shutter mechanism.

[Figure 8]

A schematic view illustrating a main section of the shutter mechanism in a state only a shutter lever is charged.

[Figure 9]

A schematic view illustrating a main section of the shutter mechanism when the shutter charge is completed.

[Figure 10]

A schematic view illustrating a main section of the shutter

mechanism as exposing.

[Figure 11]

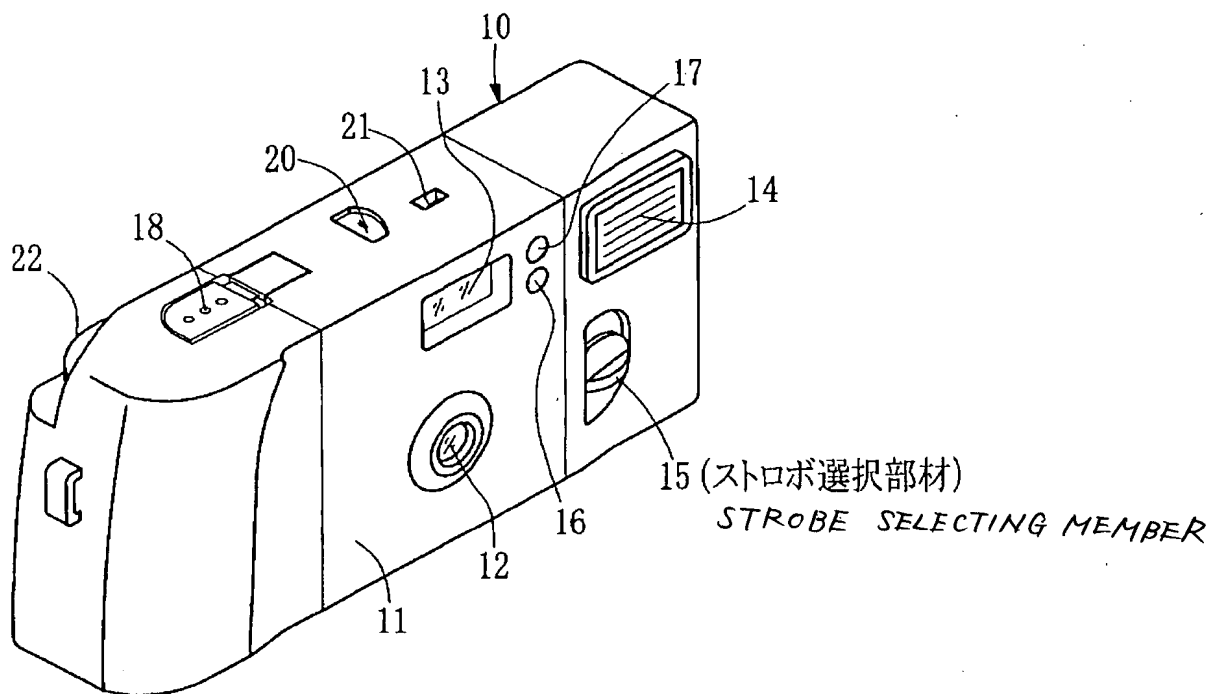
A schematic view illustrating a main section of an exposure control device when the subject luminance is high (A) and when the subject luminance is low (B).

[DESCRIPTION OF THE REFERENCE NUMBERS]

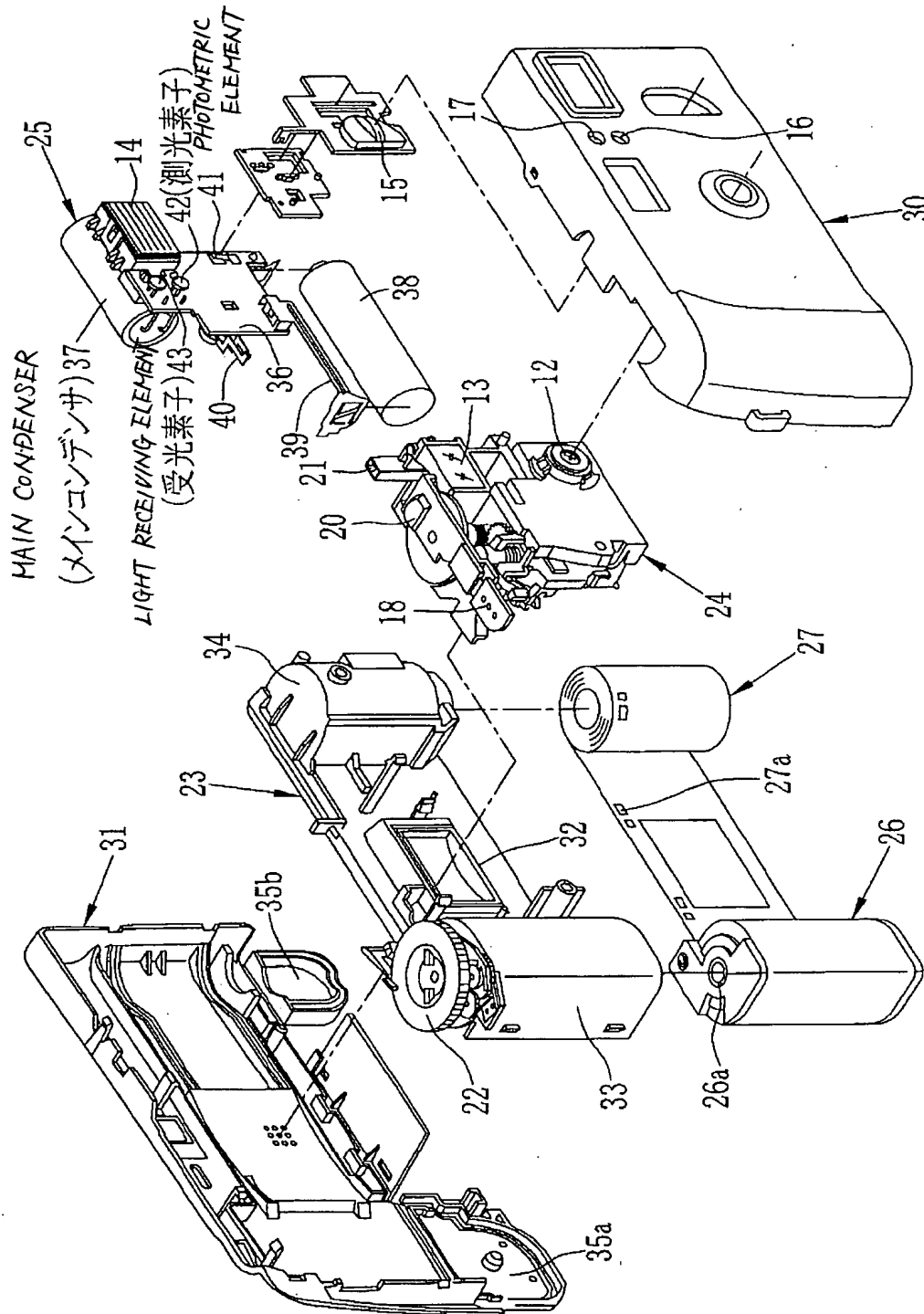
- 15 strobe selecting member
- 37 main condenser
- 42 photometric element
- 43 light receiving element
- 50 auto-strobe circuit
- 60 photometric circuit
- 63 diaphragm plate
- 67 small diaphragm aperture
- 68 large diaphragm aperture

【書類名】 図面 DRAWING
DOCUMENT NAME

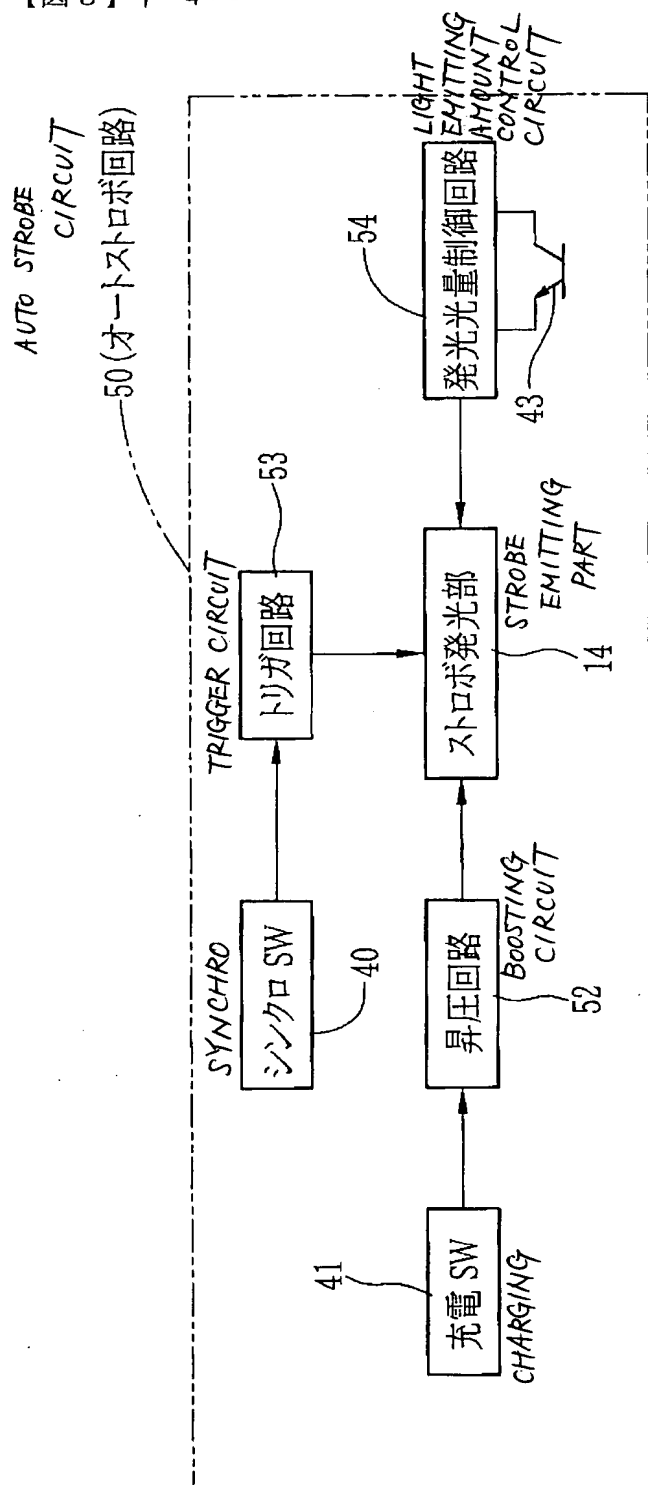
【図 1】
FIG. 1



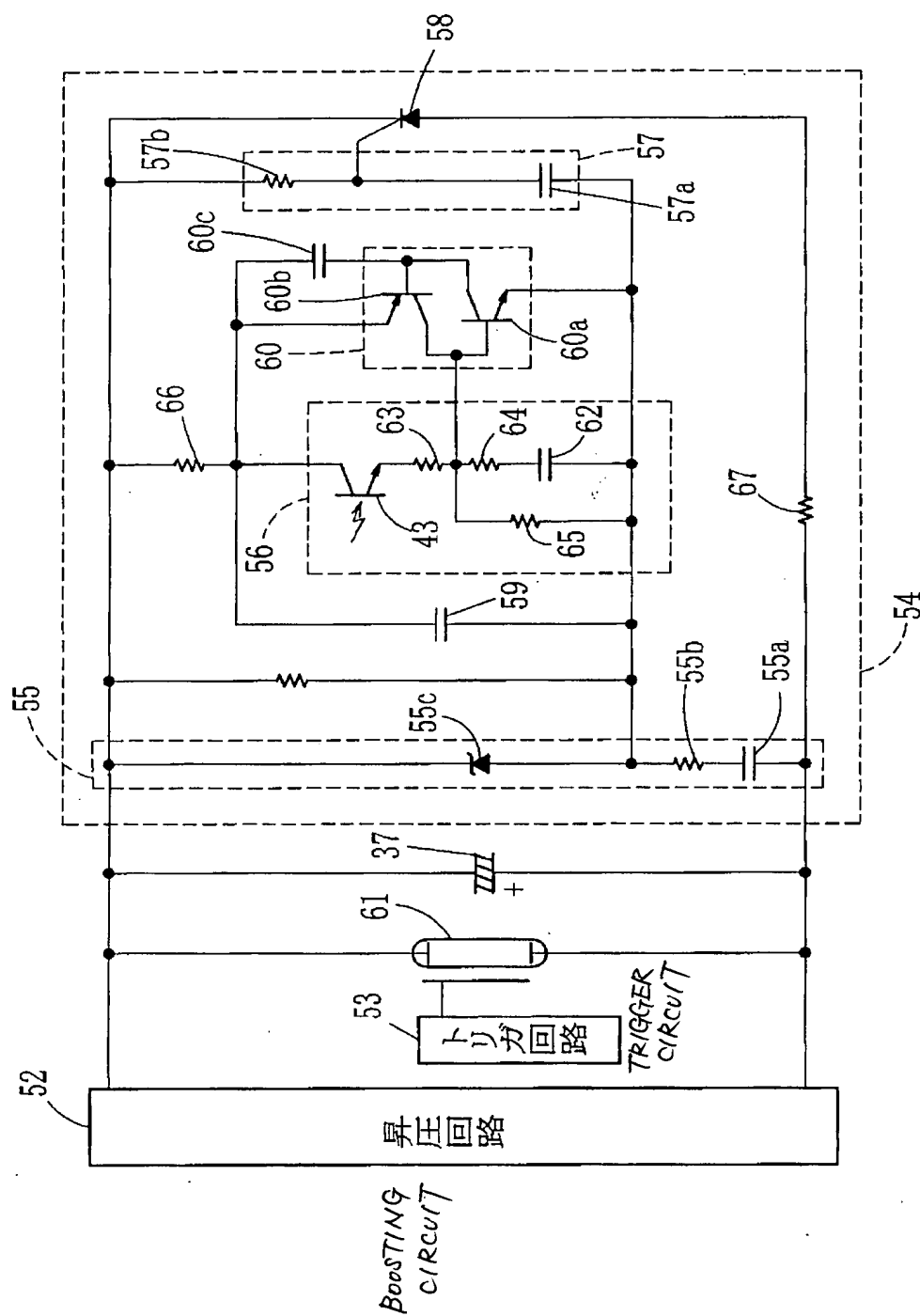
【図 2】 FIG. 2



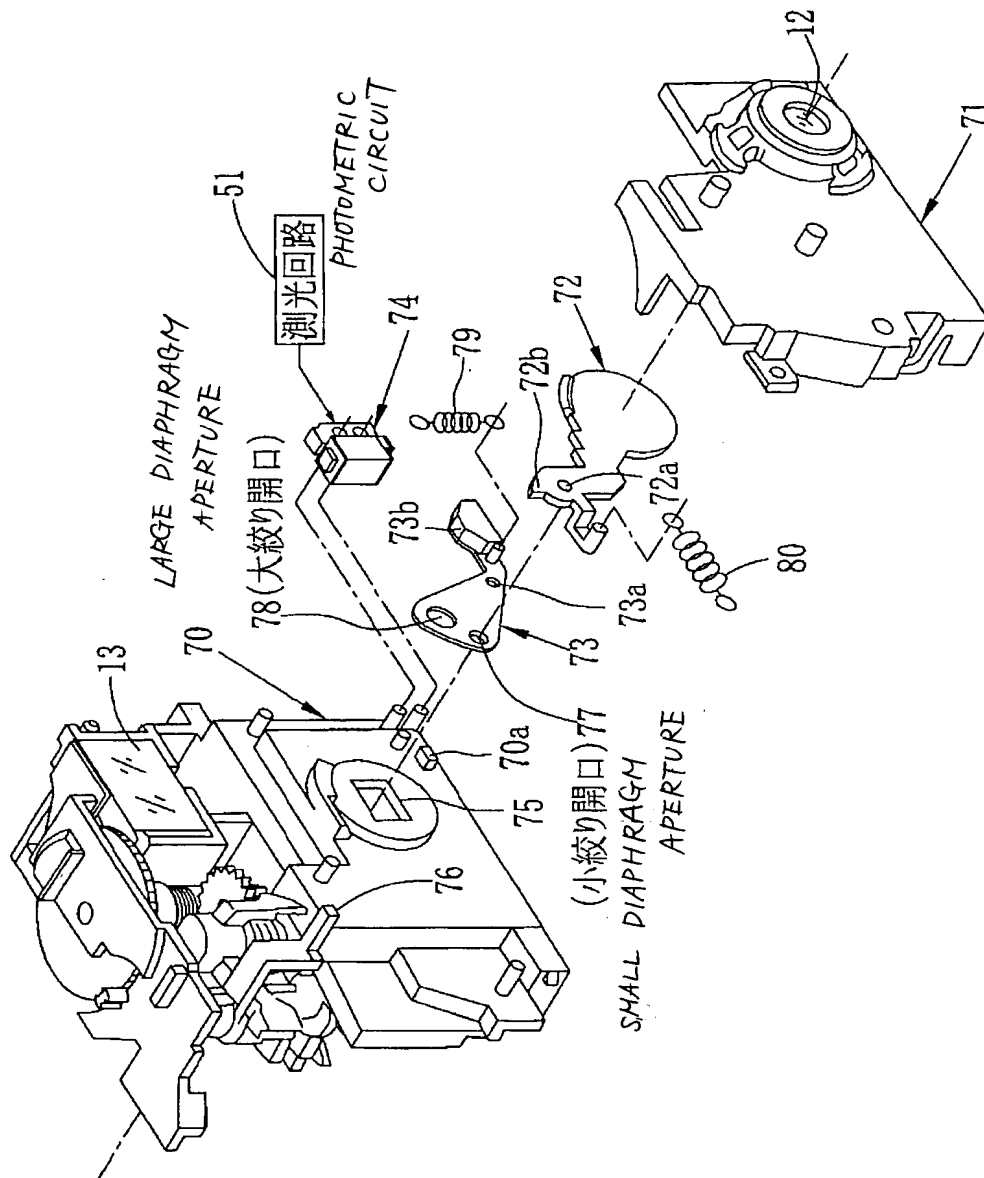
【図 3】 FIG. 3



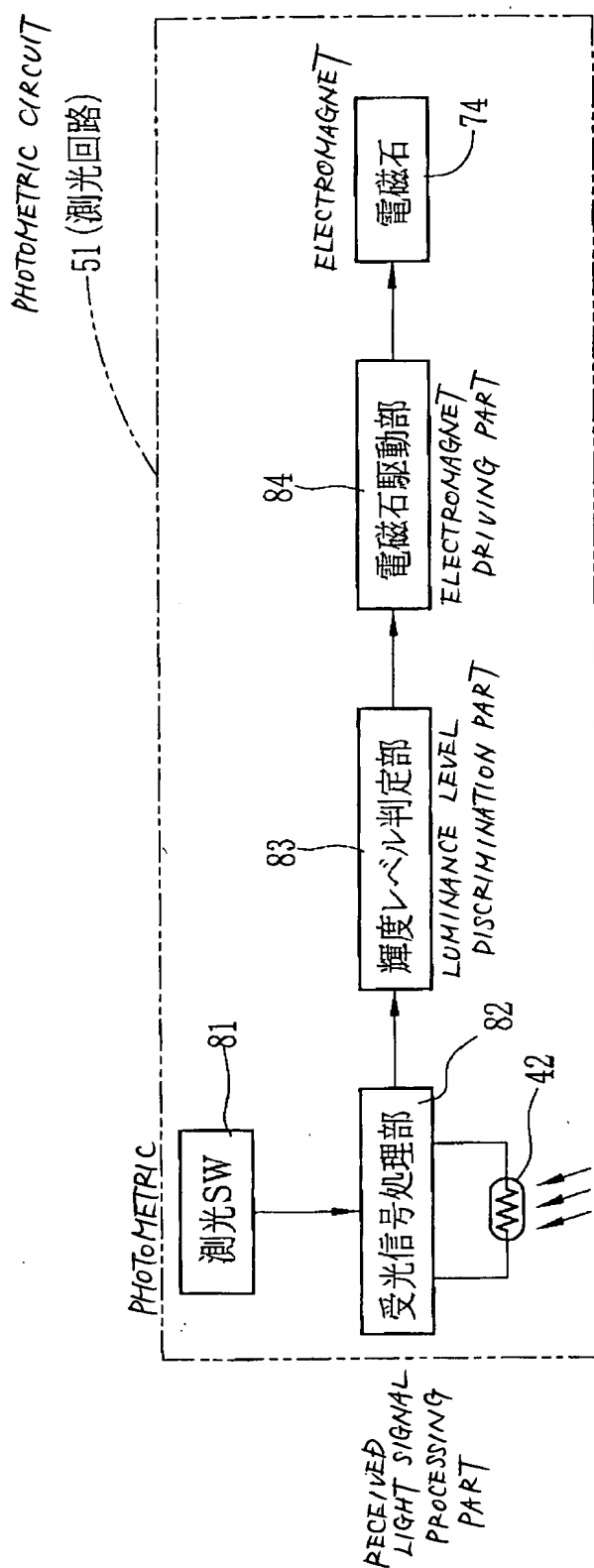
【図4】 $F \perp G.4$



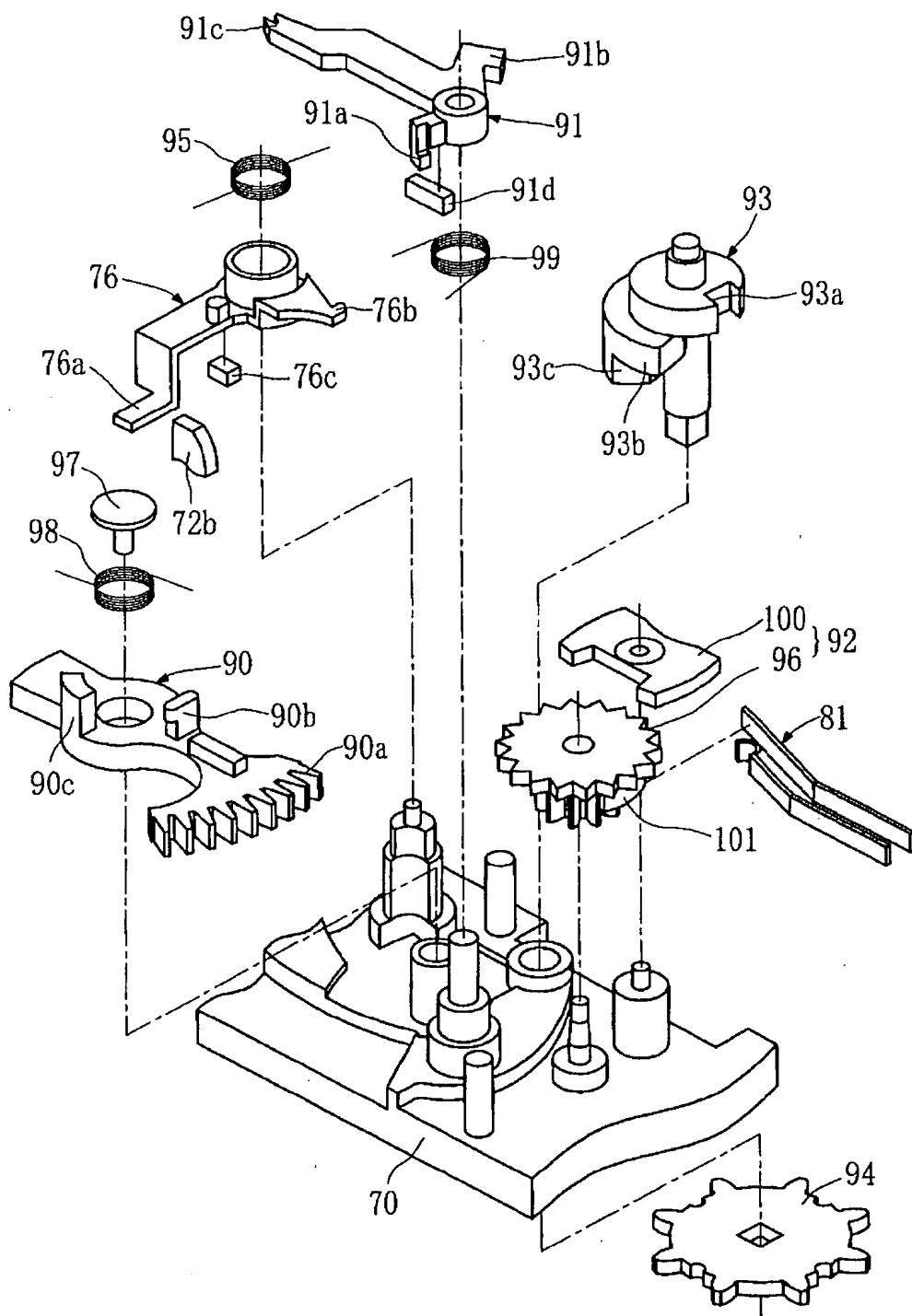
【図 5】 FzQ. 5



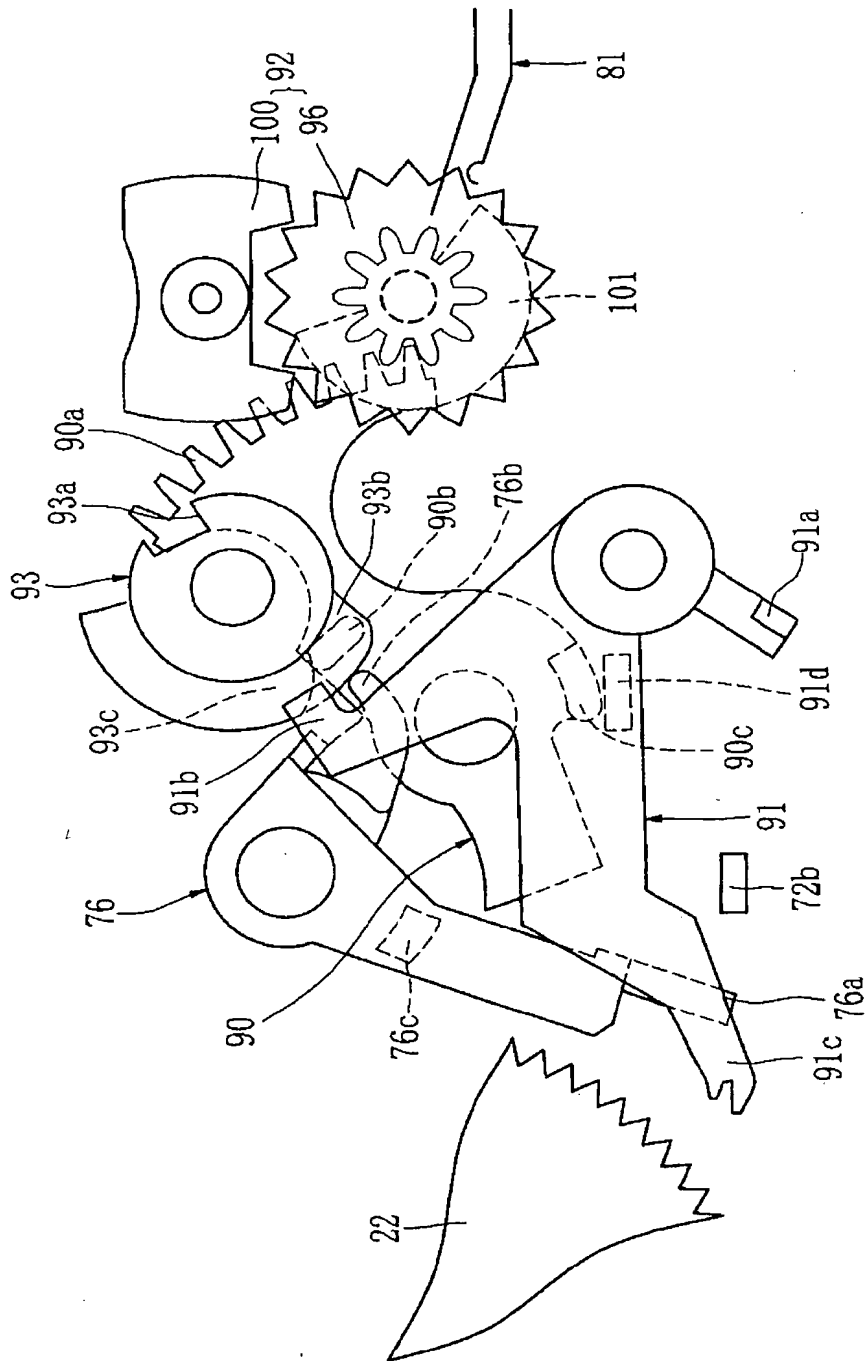
【図 6】 FIG. 6



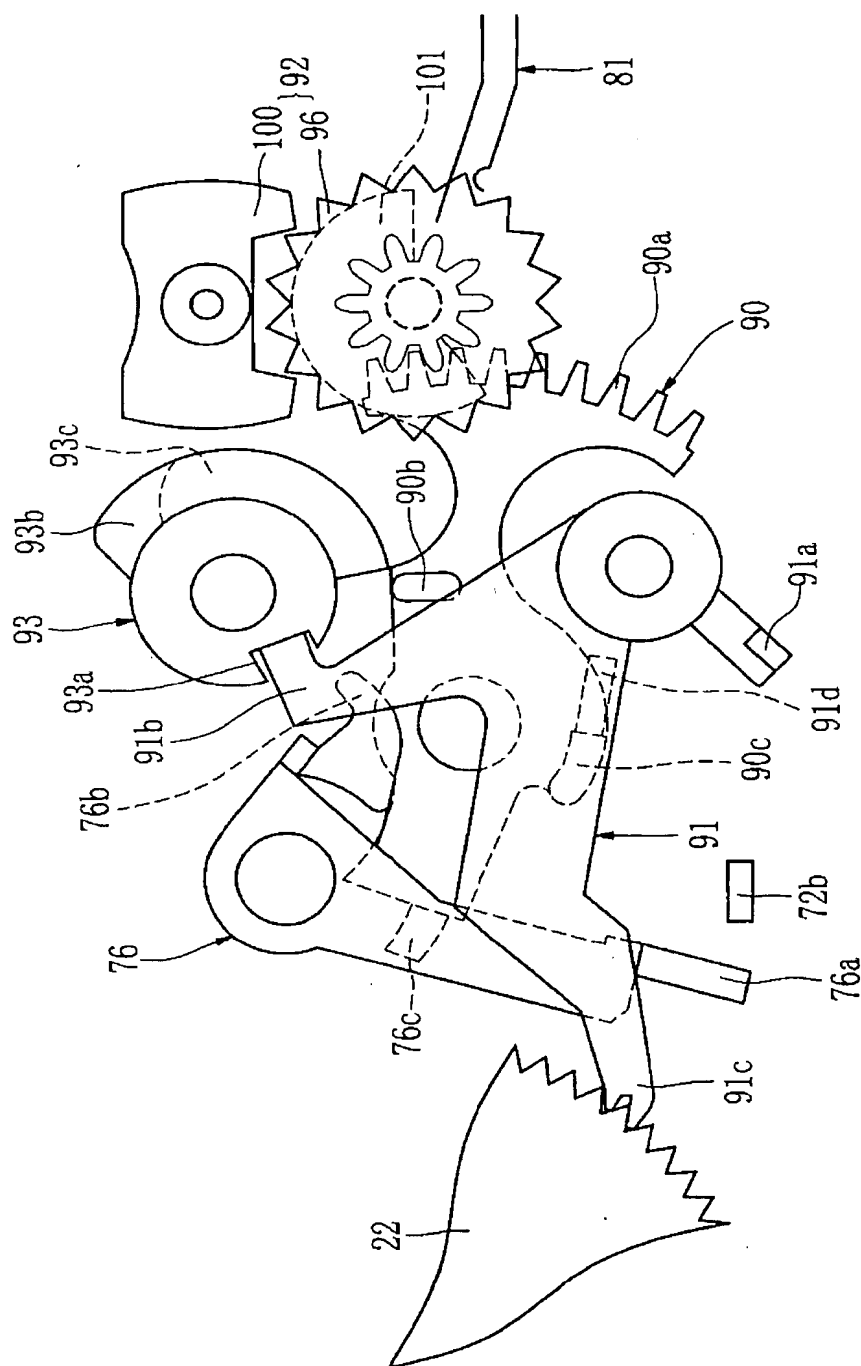
【図 7】 FIG. 7



【図 8】 FIG. 8

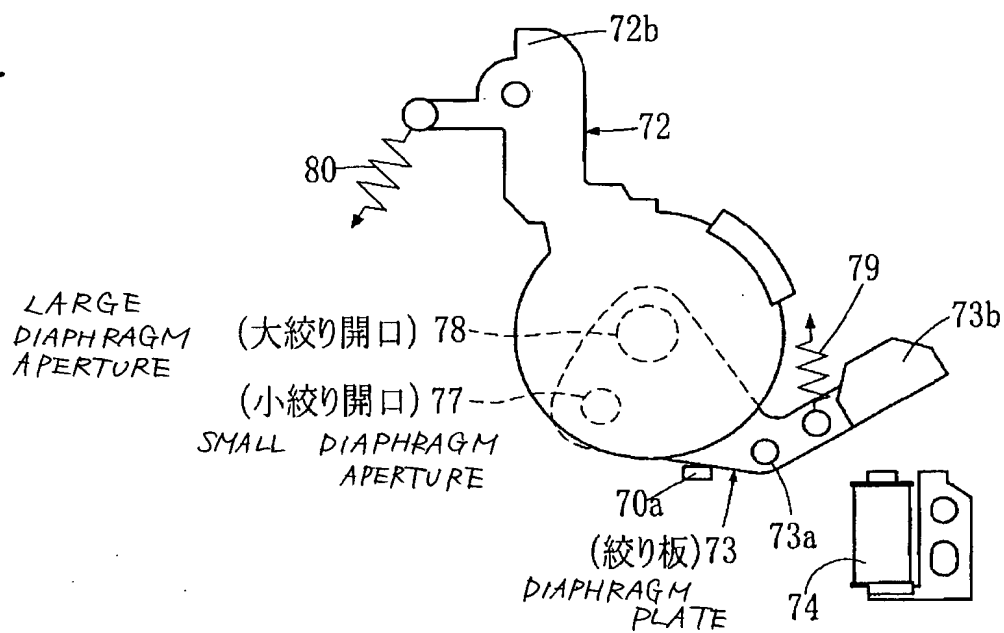


【図9】 $F \perp G. 9$

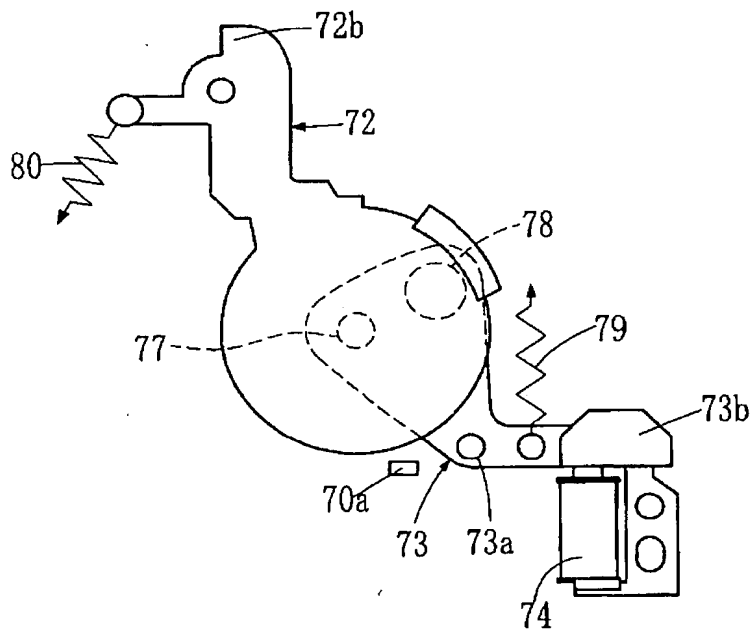


【図 1 1】 FIG. 11

(A)



(B)



[TITLE OF DOCUMENT] Abstract

[ABSTRACT]

[OBJECT] Preventing a main subject in a short distance from being overexposed in strobe photographing.

[RESOLUTION] A photometric circuit and an auto-strobe circuit are provided to a print base plate 36. In strobe photographing, the strobe selecting member 15 is slid to an on position. When the shutter button 18 is pressed, first the photometric circuit operates to dispose a large diaphragm aperture or a small diaphragm aperture on a photographing optical axis. A photometric element measures a subject luminance. If the subject luminance is lower than a predetermined level, the photometric circuit disposes the large diaphragm aperture on the photographing optical axis. Next, a strobe emitting part 14 emits light. The strobe light reflected on the subject is received by a light receiving element 43. The auto-strobe circuit stops emitting strobe light when the charging voltage flowed from the light emitting element 43 reaches a standard voltage. Since strobe emitting is stopped halfway through the strobe emitting, the main subject may be prevented from being overexposed.

[ELECTED FIGURE] Figure 2

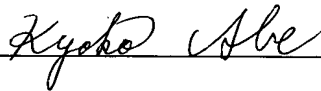
STATUTORY DECLARATION

I, Kyoko ABE, of Taiyo Seimei Otsuka Building 3F, 2-25-1, Kitaotsuka, Toshimaku, Tokyo, 170-0004, Japan, do solemnly and sincerely declare as follows:

I am well acquainted with the English and Japanese languages.

The attached translation is true into the English language of the accompanying certified copy of the document filed in the name of Fuji Photo Film Co., Ltd., in the Japanese Patent Office on 18 September 2000, in respect to an application for Patent.

This 17th day of May 2004,

A handwritten signature in cursive script, appearing to read "Kyoko ABE", is written over a horizontal line.

Kyoko ABE

2000-281679

[TITLE OF THE DOCUMENT] Patent Application

[REGULATION NUMBER] P20000918A

[FILING DATE] 18 September 2000

[ATTENTION TO] Commissioner, Patent Office

[INTERNATIONAL PATENT CLASSIFICATION] G03C 3/00

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[TELEPHONE NUMBER] 03-3917-1917

[FEE]

[PREPAYMENT BOOK NUMBER] 011844

[PAID AMOUNT] 21000

[LIST OF FILED DOCUMENTS]

[TITLE] Specification 1

[TITLE] Drawings 1

[TITLE] Abstract 1

[PROOF] Need

[TITLE OF DOCUMENT] Specification

[TITLE OF THE INVENTION] Lens-fitted film unit.

[SCOPE OF CLAIMS]

[CLAIM 1] A lens-fitted film unit wherein a photo film is preloaded, and an automatic diaphragm changeover mechanism for changing over an aperture between a large diaphragm aperture and a small diaphragm aperture by measuring subject luminance and a shutter mechanism for executing exposure said photo film are mounted therein,

characterized in photographing with a diaphragm value, a shutter speed, and a film sensitivity meeting

$$6 \leq AV+TV-SV+5 < 11.5$$

when said automatic diaphragm changeover mechanism is released, and meets

$$10.5 \leq AV+TV-SV+5 \leq 15$$

when said automatic diaphragm changeover mechanism is in a state of a small diaphragm aperture.

[CLAIM 2] A lens-fitted film unit claimed in claim 1, characterized in that said diaphragm value of said automatic diaphragm changeover mechanism is less than F8 as said large diaphragm aperture and more than F14.0 as said small diaphragm aperture.

[CLAIM 3] A lens-fitted film unit claimed in claim 1 or 2, characterized in that said automatic diaphragm changeover mechanism has LV10.5-11.5 of a brightness of a diaphragm changeover point.

[CLAIM 4] A lens-fitted film unit claimed in one of claim 1 or 3, characterized in mounting a strobe device wherein a guide number (Gno) is $4 \leq \text{Gno} < 8$.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[FIELD OF INVENTION]

The present invention relates to a lens-fitted film unit and, in particular, an improvement of the lens-fitted film unit provided with the automatic diaphragm changeover device.

[0002]

[PRIOR ARTS]

A various types of lens-fitted film units wherein simple photographing mechanisms are mounted and photo films are preloaded are sold. In the lens-fitted film unit, a photographing field depth is set deep so as to gain fine focus to a subject in from a short distance about 1m to an unlimited distance, and the diaphragm value is set about F10.

[0003]

Some of the various types of the lens-fitted film unit have a strobe device mounted therein, in order to enable photographing indoors or in nighttime. Since the diaphragm value is set about F10, the strobe device has a large light emitting amount wherein the guide number is about 10.

[0004]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

In the above lens-fitted film unit, a luminance difference between a main subject (a person and the like, for example) to

which strobe light reaches and a background to which the strobe light does not reach in strobe photographing. If printing the photo film photographed in such condition with in accordance with the luminance of the main subject, the background turns out to be dark as night and the main subject looks as if popping up. Therefore, the lens-fitted film unit could not photograph the naturally appeared background under the condition of low luminance.

[0005]

In order to solve such problem, the lens-fitted film unit, wherein the diaphragm aperture is set large in strobe photographing, is cited in Japanese Patent Laid-Open Publication Number H08-114836 and H10-333287. However, a photographer must judge whether to execute strobe photographing when using the lens-fitted film unit wherein the diaphragm aperture is changed over as strobe photographing, and overexposure or underexposure is occurred if the photographer mistakes the judging.

[0006]

Against that, a variety of lens-fitted film unit wherein the automatic diaphragm changeover mechanism for changing over the diaphragm value by measuring subject luminance, the automatic diaphragm changeover mechanism, however, both the main subject and the background cannot be photographed appropriately if the diaphragm value, a shutter speed, a film sensitivity, and a guide number of the strobe are not appropriately set.

[0007]

An object of the present invention is to solve the above problem by providing the lens-fitted film unit wherein appropriate photographing may be executed under a variety of photographing conditions.

[0008]

[MEANS FOR SOLVING THE PROBLEMS]

In order to solve the above problem, with the lens-fitted film unit of the present invention, photographing is executed with a diaphragm value, a shutter speed, and a film sensitivity meeting

$$6 \leq AV+TV-SV+5 < 11.5$$

when the automatic diaphragm changeover mechanism is released, and meeting

$$10.5 \leq AV+TV-SV+5 \leq 15$$

when the automatic diaphragm changeover mechanism is in a state of a small diaphragm aperture.

[0009]

The diaphragm value is less than F8 as the large diaphragm aperture and more than F14.0 as the small diaphragm aperture. Furthermore, a brightness at the changing over point of the automatic diaphragm changeover mechanism is LV10.5-11.5.

[0010]

The guide number (Gno) of the strobe device is $4 \leq Gno < 8$.

[0011]

[EMBODIEMENTS OF THE INVENTION]

Fig.1 shows an appearance of a lens-fitted film unit of the present invention. The lens-fitted film unit 2 is composed of a unit body 3, wherein a photo film is loaded and a variety of photographing mechanisms are mounted, and a label 4 attached to rap around the outer surface of the unit body 3. An opening is formed on the label 4 to expose each part of the unit body 3.

[0012]

The front side of the unit body 3 is provided with a taking lens 5, an ocular side finder window 6, a strobe emitting part 7, a strobe operating member 8, and a photometric window 9. On the upper face of the unit body 3, a shutter button 11, a counter display window 12, a charging completion display member 13, and the like. A part of winding knob 14 for winding an exposed film is exposed at the rear side of the unit body 3.

[0013]

As shown in Fig.2 of disassembled view, the unit body 3 is composed of a body part 16, a strobe unit 17, a front cover 18, a rear cover 19, a switch plate 20, a receiving plate 21, a battery 22, a film cartridge 23, and an exposure unit 26. The film cartridge 23 is of IX 240 type, and composed of a cartridge body 24 and a photo film 25 contained in the cartridge body 24.

[0014]

A dark box 27 for light shielding a photographing optical path between the taking lens 5 and the photo film 25 is integrally formed at the center of the front side of the body part 16. At both sides of the dark box 27, a cartridge chamber 28 containing

the cartridge body 24, and a film chamber 29 containing the photo film 25 drawn out the cartridge body 24 and wound into a roll shape are integrally formed. An exposure opening 27a is formed at the front surface of the dark box 27, and an aperture is provided at the rear surface of the dark box 27. The photo film 25 is exposed after stopped in a position facing the aperture.

[0015]

A winding knob 14 is rotatably attached on the cartridge chamber 28. A driving shaft is rotatably attached to the lower side of the winding knob 42 for engaging with the end of a spool of the cartridge body 24 via the cartridge chamber 28. When the winding knob is operated to rotate after a frame is photographed, the exposed part of the photo film 25 is wound into the cartridge body 24. On the upper surface of the cartridge chamber 28 and under the winding knob 14, a light shielding lid closing mechanism is mounted for closing the light shielding lid of the cartridge body 24.

[0016]

The exposure unit 26 is composed of a unit base part 30 attached to the front side of the dark box 27, the shutter mechanism attached to the unit base part 30, a film winding stop mechanism, a counter mechanism, the automatic diaphragm changeover mechanism, and the like. As shown in Fig.3, a photographing opening 31 to let subject light enter the dark box 27 is provided at the front surface of the unit base part 30. A shutter blade 33 is attached to a pin 32 provided above the photographing opening 31. The shutter blade 33 is swingably

attached between a closing position to close the photographing opening 31 by a disc 33a and an opening position to open the photographing opening 31, and originally biased to the closing position by a spring for a shutter 34.

[0017]

A projection part 33b at the upper edge of the shutter blade 33 is pressed in the right side in the figure by the shutter driving member composing the shutter mechanism, when the shutter button 11 is pressed and the release operation is performed by the shutter mechanism. Thereby, the shutter blade 33 swings into the opening position in a clockwise direction against the bias of the spring for shutter 34. After opening the photographing opening 31, the shutter blade 33 swings counterclockwise by the bias of the spring for shutter 34 to close the photographing opening 31.

[0018]

In front of the unit base part 30, a lens holder protecting the shutter blade 33 and holding the taking lens 5 is attached. A cylindrical part 37 for containing the taking lens 5 is provided at the front surface of the lens holder 36. A large diaphragm aperture 38 having a large diameter is formed at the position of facing the photographing opening 31 in the cylindrical part 37.

[0019]

The pin 40 provided on the side of the photographing opening 31 is inserted into a hole 41b of a diaphragm plate 41 so as to swingably hold the diaphragm plate 41. The diaphragm plate

41 is disposed between the shutter blade 33 and the lens holder 36. At one end of the diaphragm plate 41, a small diaphragm hole 42 is provided to reduce the diaphragm amount by entering between the photographing opening 31 and the large diaphragm hole 38. The other end of the diaphragm plate 41 is biased upwards by a spring for diaphragm 43 hooked to the pin 41a. Thereby, As shown in Fig.4 (A), one end of the diaphragm plate 41 is originally in a position of a large diaphragm evacuating from between the photographing opening 31 and the large diaphragm aperture 38. A sucked piece 44 formed of a metallic magnetic material such as iron is attached to the other end of the diaphragm plate 41.

[0020]

An electromagnet 46 for swinging the aperture plate 41 and the strobe unit 17 is attached to a side of the unit base part 30. The strobe unit 17 is composed of a print base plate 47 and a strobe emitting part 7 attached to the print base plate 47. The strobe emitting part 7 is composed of a discharge tube for discharging strobe light, a reflector for reflecting the strobe light discharged from the discharge tube toward subject, and a diffusion board for diffusing the strobe light, and is exposed from the front side of the unit body 3.

[0021]

a charging switch 49 being turned on/off according to the up and down slide operation of the strobe selecting member 8, a synchro-switch 50 to be turned on by being pressed an arm part 33c provided to the shutter blade 33 as the shutter blade swings

to the opening position, a metal armature 51 to connect a battery 22 to the strobe circuit, and a photometric element 52 are attached to the print base plate 47. As the photometric element 52, a CdS wherein a resistance value changes based on the receiving light amount is used and face the photometric window 9 of the unit body 3.

[0022]

A strobe circuit and an AE circuit 54 for controlling the automatic diaphragm changeover mechanism for changing is formed on the print base plate 47. The AE circuit 54 drives the photometric element 52 for controlling the automatic diaphragm changeover mechanism. The AE circuit 54 generates photometric signal from the resistance value of the photometric element 52 changed by the subject luminance, and judges whether the subject luminance is low with comparing a voltage of the photometric signal and a predetermined standard voltage. Thereby, if is judged that the subject luminance is high, the electromagnet 46 is applied current.

[0023]

When the electromagnet 46 is applied current, a magnetic force is generated in the sucking part 46a of the electromagnet 46 to suck the sucked piece 44 attached to the end of the diaphragm plate 41. Thereby, the diaphragm plate 41 swings clockwise against the bias of the spring for diaphragm 43 and is disposed at a small diaphragm position, wherein the small diaphragm hole 42 is inserted between the photographing opening 31 and the 38, as shown in Fig.4(B).

[0024]

In order to prevent an exposure defect generated by the diaphragm plate 41 shifts while exposing, the AE circuit 54 holds the photometric signal from the light receiving element 52 for a certain time (about 100ms-200ms). That is, the AE circuit 54 continues to hold the diaphragm plate 41 in the small diaphragm position if the subject luminance is reduced in exposure after the diaphragm plate 41 is shifted to the small diaphragm position.

[0025]

A shutter mechanism shown in Fig.5 is attached to the upper part of the dark box. The shutter mechanism is composed of a shutter lever 57, a stop release lever 61, a stop lever 62, a release lever 63, and a cam 64.

[0026]

A disc wherein a notched aperture 64a to lock the release lever and a circular 1 cam piece 64b abutting the shutter lever 57 are provided to the cam 64. A shaft of the cam 64 engages with a sprocket 65 disposed inside the unit base part 30. The sprocket engages with a perforation 25a of the photo film 25 and is driven to rotate counterclockwise with corresponding to the winding of the photo film 25.

[0027]

The shutter lever 57 is composed of a shutter projection 57a for kicking the projection part 33b of the shutter blade 33, a groove 57b for engaging with the engagement releasing lever 61, a supporting pole 57c for holding a torsion spring (65 and

71, described later), and a cam face 57 abutting the stop lever 62. The shutter lever 57 shifts to a charge position when shutter charge is executed and to a release position by the of shutter release operation. In the rotary path of the shutter projection 57a, the projection part 33b of the shutter blade 33 is disposed, and a top part 33b of the shutter blade 33 is kicked while the shutter lever 57 shifts from the charge position to the release position, then the exposure is executed.

[0028]

The stop release lever 61 is composed of a hook 61a, a switch pressing part 61b, an upper projection 61c, a lower projection 61d, and a release part 61e, and held by the same shaft as that of the shutter lever 57. A torsion spring 65 is attached on the stop release lever 61. One end of the torsion spring 65 abuts the hook 61a, and the other end abuts the supporting pole 57c of the shutter lever 57. The hook 61a is provided to abut a protrusion part 64b of the cam 64, and since the hook 61a is pushed by the protrusion part 64b as the cam 64 rotates counterclockwise in the figure, the stop release lever 61 rotates clockwise in the figure.

[0029]

The lower projection 61d of the stop release lever 61 is provided under the switch pressing part 61b so as to be able to be inserted into the groove 57b of the shutter lever 57. A contact piece of the photometric switch 55 is inserted into the rotary path of the switch pressing part 61b. When the stop release lever 61 rotates, the switch pressing part 61b abuts

the photometric switch 55 to turn on the photometric switch 55, and the photometric circuit 56 operates. In order to limit the rotary range of the stop release lever 61, a stopper 6 is provided in the dark box 42.

[0030]

The stop lever 62 is disposed so as to abut the shutter lever 57 and the stop release lever 61, and a compression spring 67 is attached to one end of the stop lever 62. The stop lever 62 is composed of two stages of an upper stage 62a abutting a release part 61e of the stop release lever 61 and a lower stage 62b abutting the cam face 57d of the shutter lever 57. The lower stage 62b of the stop lever 62 is inserted into the rotary path of the cam face 57d of the shutter lever 57, and the stop lever 62 is rotatable between an inserting position to hold the shutter lever 57 in the charge position and an evacuating position evacuating from the rotary path of the cam face 57d and allowing the shutter lever 57 to shift to the release position. The stop lever 62 is always biased toward the inserting position by the compressing spring 67.

[0031]

The release lever 63 is composed of a release part 63a, an engaging claw 63b, a winding stop part 63c, and a projection 63d, and held by a shaft 70 integrally formed on the unit base plate 30. The torsion spring 71 is disposed under the release lever 63. The torsion spring 71 is supported on a projection 70a formed on a shaft 70, and one end of the torsion spring 71 is held by the release part 63a and the other side abuts the

supporting pole 57c of the shutter lever 57.

[0032]

The engaging claw 63b of the release lever 63 is provided so as to hold the release lever 63 by entering the notched aperture 64b of the cam 64. The winding stop part 63c locks the rotation of the winding knob by engaging with the groove formed at the periphery of the winding knob 14 as the release lever 63 rotates clockwise in the figure. The projection 63d is attached under the release lever 63 to prevent the swing of the stop release lever 61 by abutting the upper projection 61c of the stop release lever as shutter charge is executed. When the shutter button 17 is pressed down, the release part 63a is pressed by a protrusion (not shown) integrally provided with the shutter button 17, and the release lever 63 rotates counterclockwise in the figure against the bias of the torsion spring 71.

[0033]

Fig. 6 shows a schematic view of the shutter mechanism. This figure shows a state before the shutter charge is executed. The stop release lever 61 is biased by the torsion spring 65, and the releasing part 61e stops with abutting the stopper 66. The shutter lever is held in a state wherein the lower projection 61d of the stop release lever 61 enters the groove 57b, and the release lever stops in a state wherein the projection 63d abuts the upper projection 61c of the stop release lever 61. The upper stage 62a of the stop lever 62 is held in the evacuating position with abutting the release part 61e of the stop release lever

61.

[0034]

When the winding knob is turned, the cam 64 rotates counterclockwise in the figure together with the sprocket 65. Then, the protrusion part 64b of the cam 64 abuts the hook 61a of the stop release lever 61 and, as shown in Fig.7, the stop release lever 61 rotates clockwise in the figure against the bias of the torsion spring 65. Furthermore, since the lower projection 61d of the stop release lever 61 presses the groove 57b of the shutter lever 57, the shutter lever 57 rotates clockwise in the figure against the bias of the torsion spring 71. The release lever cannot be shifted, as the projection 63d of the release lever 63 abuts the upper projection 61c of the stop release lever 61.

[0035]

After that, since the upper projection 61c of the stop release lever 61 shifts outside the rotary path of the projection 63d of the release lever 63 when the shutter lever 57 reaches the charge position, the release lever 63 rotates clockwise in the figure by the bias of the torsion spring 71. Then, as shown in Fig.8, The engaging claw 63b of the release lever 63 enters the notched aperture 64a of the cam 64 and, at the same time, the winding stop part 63c fits in a groove formed at the periphery of the winding knob 14, then the release lever 63 is locked.

[0036]

In this time, the hook 61a of the stop release lever 61 stays

away from the protrusion part 64b of the cam 64, and the shutter lever 57 and the release lever 63 tries to rotate clockwise in the figure. However, since the stop lever 62 is inserted in the inserting position and the lower stage 62b of the stop lever 62 abuts the cam face 57d of the shutter lever 57, the turn of the shutter lever 57 is locked. By the rotation of the release lever 63, the projection 63d is inserted in the rotary path of the upper projection 61c of the stop release lever 61, and the turn of the stop release lever is locked. Thereby, the shutter charge is completed in a condition wherein the shutter lever is held in a charge position.

[0037]

Since the release part 63a of the release lever 63 is pressed into the counterclockwise direction in the figure by the shutter button 17 when the shutter button 11 is pressed down while the shutter charge is executed, the release lever 63 rotates counterclockwise in the figure against the bias of the torsion spring 71, as shown in Fig.9. Then, since the engagement of the projection 63d of the release lever 63 and the lower projection 61d of the stop release lever 61 is released, the stop release lever 61 starts rotating counterclockwise in the figure by the bias of the torsion spring 65. When the stop release lever 61 turns, the switch pressing part 61b touches the piece of the photometric switch 55, the photometric switch 55 is turned on and the photometry is started. Additionally, since the release part 61e of the stop release lever 61 rotates with pressing the upper stage 62a of the stop lever 62, the stop lever 62 starts

shifting from the insert position to the evacuating position against the bias of the compression spring 67. On the other hand, the shutter lever 57 is held in the charge position, as the cam face 57b abuts the lower projection 62b of the stop lever 62.

[0038]

Then, when the stop release lever 61 rotates in a certain amount and the stop lever shifts to the evacuating position, the engagement of the lower projection 62b and the cam face 57d of the shutter lever 57 is released. Since the bias of the torsion spring 71 is stronger than that of the torsion spring 65, the shutter lever 57 starts shifting from the charge position to the release position by the bias of the torsion spring 71. Then, as shown in Fig.10, the projection part 33b of the shutter blade 33 is kicked by the shutter projection 57a as the shutter lever 57 shifts, and the exposure is executed.

[0039]

In the shutter mechanism of the present invention, a time lag is generated for the stop release lever 61 to rotate in a certain amount, after the photometric switch 55 is turned on and before the exposure is executed. By adjusting the time lag about 10ms, a required time for the diaphragm plate 45 to shift, by means of optimization of the intensity of the torsion spring 65 and the shapes of each parts, the exposure is executed after the diaphragm is changed over certainly.

[0040]

The rear cover 19 is attached to cover the rear side of the body part 16. An ocular side finder window 73, a pull-top style

bottom lids 19a and 19b to shield the bottoms of the cartridge chamber 28 and the film chamber 19 respectively are integrally formed on the rear cover 19. The bottom lids 19a and 19b are closed after the rear cover 19 is attached to the body part 16 so as to shield the cartridge chamber 28 and the film chamber 19 light-tightly. The bottom lid 19a is opened when a film cartridge 23 is removed in a processing station.

[0041]

An opening for taking lens 18a to expose the taking lens 5 forward, an opening 18b to expose the strobe operating member 8, an opening 18c to expose the strobe emitting part 7 are formed at a front face of the front cover 18 so as to cover the front side of the body part 16. Though not shown in detail in the figure, a protective plate formed of transparent or half transparent plastic is mounted in the photometric window 9, in order to prevent dust from the photometric window 9 from entering the unit body 3.

[0042]

The strobe operating member 8 is integrally formed on the front side of the switch plate 20 mounted between the front cover 18 and the strobe unit 17. The receiving plate 21 support the switch plate 20 so as to be slidable between the lower off position and the upper on position. A projection (not shown) is formed at the rear face of the switch plate 20, so as to for press and turn on the charging switch 49 of the strobe unit 17 as the strobe operating member 8 is slid to the on position

[0043]

The engaging part 20a engaging with the charge completion display member 13 mounted in the side of the exposure unit 26 is integrally formed on the switch plate 20, so as to protrude the charge completion display member 13 outside the upper face of the lens-fitted film unit 2, when being slid to the on position. The charge completion display member 13 is attached to be slidable up and down to the side of the exposure unit 26 and functions as a light guide formed of a transparent plastic. When the charge completion display member 13 is shifted upwards, the light of a neon tube attached to the print base plate 47 is reflected internally and guided to outside the lens-fitted film unit 2, and the photographer and a person are informed that photographing is completely prepared.

[0044]

Next, the function of the above embodiment is explained. the photographer rotates the winding knob 14 to set the unexposed photo film 25 in a photographing position facing the aperture. Accompanying to the rotation of the winding knob 14, the shutter lever 57 is charged. When a frame of the photo film 25 is wound, feeding of the photo film 25 is stopped, as the winding stop part 63c fits the groove of the winding knob 14. In this time, since the photometric switch 55 is not turned on as far as the shutter button 11 is not pressed down, wasting of the battery 22 in vain is controlled.

[0045]

After framing the subject, the photographer presses down the shutter button 11 to photograph. Then, the stop release

lever 61 starts shifting and, at the same time, the photometric switch 55 is turned on to execute photometry. In the AE circuit 54, whether the diaphragm plate 14 is shifted from the photometric signal of the photometric element 52 is determined and the diaphragm is changed over. Then, the engagement of the shutter lever 57 is released for the shutter lever 57 to start shifting. After that, the shutter blade 33 is kicked and the photo film 25 is exposed.

[0046]

If the subject is not enough bright to be photographed in such as indoor photographing, the exposure is executed through the large diaphragm aperture 38, as the diaphragm plate 41 is held in the large diaphragm aperture shown in Fig.4 (A) by the bias of the spring for diaphragm 43. In this case, since the exposure amount is increased, a printed photograph appropriately exposed without underexposed is gained.

[0047]

If the subject, on the other hand, is very bright to be photographed in such as outdoor photographing under a fine weather, the exposure is executed through the small diaphragm aperture 42, as the diaphragm plate 41 is held in the small diaphragm aperture shown in Fig.4 (B). The exposure amount is reduced to an appropriate value by the small diaphragm aperture 42, and a photographing may be executed without overexposure.

[0048]

Under a very dark condition such as nighttime, the photographer operates the strobe operating member 8 to the on

position to execute the strobe charging, and presses the shutter button 11 to photograph after confirming the completion of the charging by wink of the with the charge completion display member 33. Then, the synchro-switch 50 is closed with accompanying to the rotation of the shutter blade 33, and the strobe light from the strobe emitting part 7 is emitted to the subject. In this strobe photographing, the exposure is executed through the large diaphragm aperture 38, as the subject luminance as photometry is executed is under the predetermined value, electric current is not flown to the electromagnet 46.

[0049]

[Example]

In order to gain all performances to appropriate photographing by the lens-fitted film unit, sample lens-fitted film units having different diaphragm values, shutter speeds, film sensitivities, and strobe guide numbers, were made and printed photo films photographed under different conditions by using them were assessed about their three sensory evaluations: brightness, sharpness, and graininess. The performances of the samples No.1 to No.4, which may gain high evaluations according to the results of sensory evaluations, are shown in Table 1 below.

[0050]

Note that the AV, TV, SV, and LV in Table 1 are determined as follows:

AV: Aperture Value

TV: Time Value

SV: Film Speed Value

LV: Light Value

AV = $\log^2 (F^2)$

TV = (1/shutter speed)

SV = (32×film sensitivity)

LV = AV+TV-SV+5

[0051]

[Table 1]

	Sample No.1	Sample No.2	Sample No.3	Sample No.4
Diaphragm Value	F5.60	F8.00	F22.00	F18.00
AV	4.97	6.00	8.92	8.34
Shutter Speed	1/60	1/100	1/150	1/100
TV	5.91	6.64	7.23	6.64
Film Sensitivity	1600	800	800	1600
SV	10.00	8.00	8.00	9.00
LV	6.88	9.64	13.15	10.98
Gno	2.47	7.07		
Arrival Distance (m)	5.00	5.00		

[0052]

According to the above samples No.1 to No.4, the following conditional expressions were derived.

Conditional express B: $6 \leq LV \leq 11.5$ (released)

Conditional express C: $10.5 \leq LV \leq 15$ (small diaphragm)

In addition, a sample A of the lens-fitted film unit having the automatic diaphragm changeover mechanism filling the above conditional expresses A and B, a sample B having the same

specifications as those of the sample A having the automatic diaphragm changeover mechanism, and a sample C of lens-fitted film unit without the automatic diaphragm changeover mechanism were made. All performances of the samples A to C are described in the following Table 2.

[0053]

[Table 2]

	Sample No.A		Sample No.B		Sample No.C
	Released	Small Diaphragm	Released	Small Diaphragm	
Diaphragm Value	F8.00	F18.00	F8.00	F18.00	F8.00
AV	6.00	8.34	6.00	8.34	6.00
Shutter Speed	1/100	1/100	1/100	1/100	1/150
TV	6.64	6.64	6.64	6.64	7.23
Film Sensitivity	1600	1600	1600	1600	800
SV	9.00	9.00	9.00	9.00	8.00
LV	8.64	10.98	8.64	10.98	10.23
Gno	5.00	5.00			
Arrival Distance (m)	5.00	5.00			

[0054]

Next, sensory evaluations about the above samples A to C of lens-fitted film units are executed. The condition of the sensory evaluations is: photographing in a bright room of about LV6, outdoor twilight of about LV 8, and at a beach in daytime

of about LV15, and showing the printed photographs gained under those conditions to 10 examinees to select the photograph having best brightness, sharpness, and graininess. The following Table 3 shows the numbers of each samples and photographing venues, and the results of the sensory evaluations are shown in Fig.4.

[0055]

[Table 3]

	Sample No.A		Sample No.B		Sample No.C	
	Released	Small Diaphragm	Released	Small Diaphragm		
LV6 (Bright Room)	Sample A1 (Strobe ON)		Sample B1 (Strobe ON)	Sample B4 (Strobe OFF)	Sample C1 (Strobe ON)	Sample C4 (Strobe OFF)
LV8 (Twilight)	Sample A2 (Strobe ON)		Sample B2 (Strobe ON)	Sample B5 (Strobe OFF)	Sample A1 (Strobe ON)	Sample C5 (Strobe OFF)
	Sample A2' (Strobe OFF)					
LV15 (Daytime Beach)		Sample A3 (Strobe OFF)	Sample B3 (Strobe ON)	Sample B6 (Strobe OFF)	Sample A1 (Strobe ON)	Sample C6 (Strobe OFF)

[0056]

[Table 43]

Sample No.	Evaluation Contents		
	Brightness	Sharpness	Graininess
Sample A1	10 people	4 people	7 people
Sample A2	10 people	2 people	6 people
Sample A2'	8 people	8 people	8 people
Sample A3	4 people	8 people	2 people
Sample B1	10 people	4 people	7 people
Sample B2	10 people	2 people	6 people
Sample B3	0 people	0 people	3 people
Sample B4	0 people	0 people	0 people
Sample B5	0 people	0 people	0 people
Sample B6	4 people	8 people	2 people
Sample C1	0 people	6 people	3 people
Sample C2	0 people	8 people	4 people
Sample C3	3 people	2 people	2 people
Sample C4	0 people	0 people	0 people
Sample C5	0 people	0 people	0 people
Sample C6	3 people	0 people	3 people

[0057]

As clearly shown by the results in the above Table 4, a fine printed photograph may not gained the by the Sample C if the condition of the photographing venue is not good. In addition, the Sample A of the lens-fitted film unit of the present invention and the Sample B, wherein the diaphragm amount may be changed over manually based on the condition of the photographing venue, have highly evaluated in all samples.

However, the Samples B3, B4 and B5, printed photographs wherein the judgments of strobe emitting are mistaken, the evaluations of the sharpness and the graininess were not good owing to the occurrence of underexposure. According to it, fine printed photographs may be always gained without causing photographing mistakes by the lens-fitted film unit of the present invention.

[0058]

Note that, in the above embodiment, though the small diaphragm aperture is inserted into the optical axis if the subject luminance is high, contrary to it, the small diaphragm aperture may evacuate from the optical axis when the subject luminance is low. Additionally, the large diaphragm aperture and the small diaphragm aperture may be provided to the changeover plate to be inserted arbitrarily into the photographing optical axis. Furthermore, by using diaphragm blades in a form of a plural of plates and changing the size of an interspace between them, the diaphragm value may be changed over

[0059]

[EFFECT OF THE INVENTION]

As explained above, the lens-fitted film unit of the present invention unlikely occurs photographing miss and may photograph with appropriate exposure amount not only the main subject but the background even under the various brightness of photographing condition, and the printed photographs with excellent appearances of background may be gained.

[0060]

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Figure 1]

A perspective view illustrating an appearance of a lens-fitted film unit of the present invention.

[Figure 2]

A disassembled perspective view of a unit body.

[Figure 3]

A disassembled perspective view of an exposure unit.

[Figure 4]

A explanation view illustrating an operated state of a diaphragm plate.

[Figure 5]

A disassembled perspective view illustrating a composition of a shutter mechanism.

[Figure 6]

A schematic view of a main part of the shutter mechanism before shutter-charge.

[Figure 7]

A schematic view of a main part of the shutter mechanism while shutter-charge.

[Figure 8]

A schematic view of a main part of the shutter mechanism when shutter-charge is completed.

[Figure 9]

A schematic view of a main part of the shutter mechanism immediately after the operation of shutter-release.

[Figure 10]

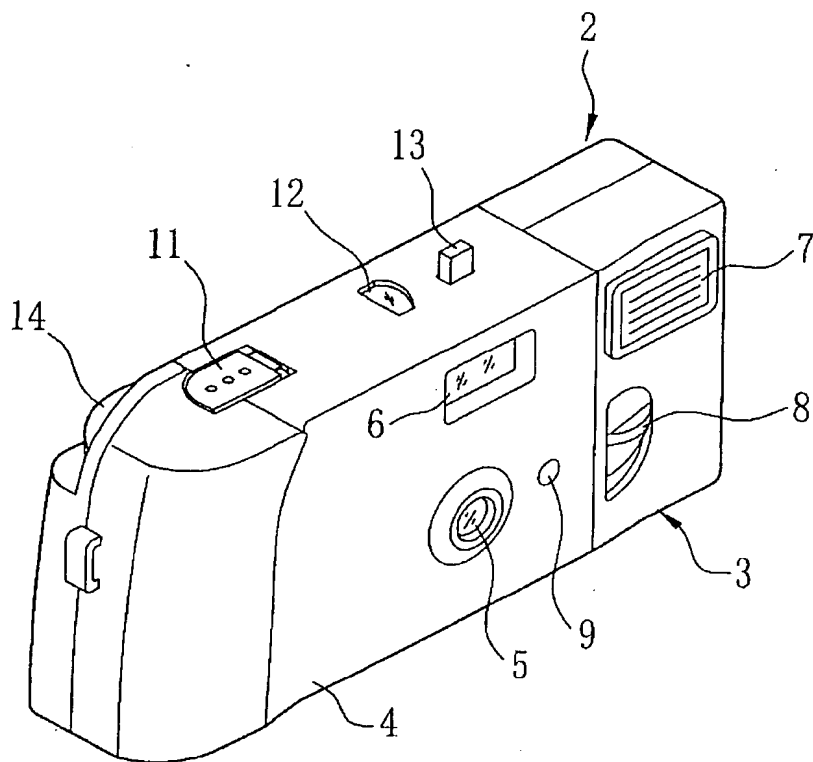
A schematic view of a main part of the shutter mechanism when exposing.

[DESCRIPTION OF THE REFERENCE NUMBERS]

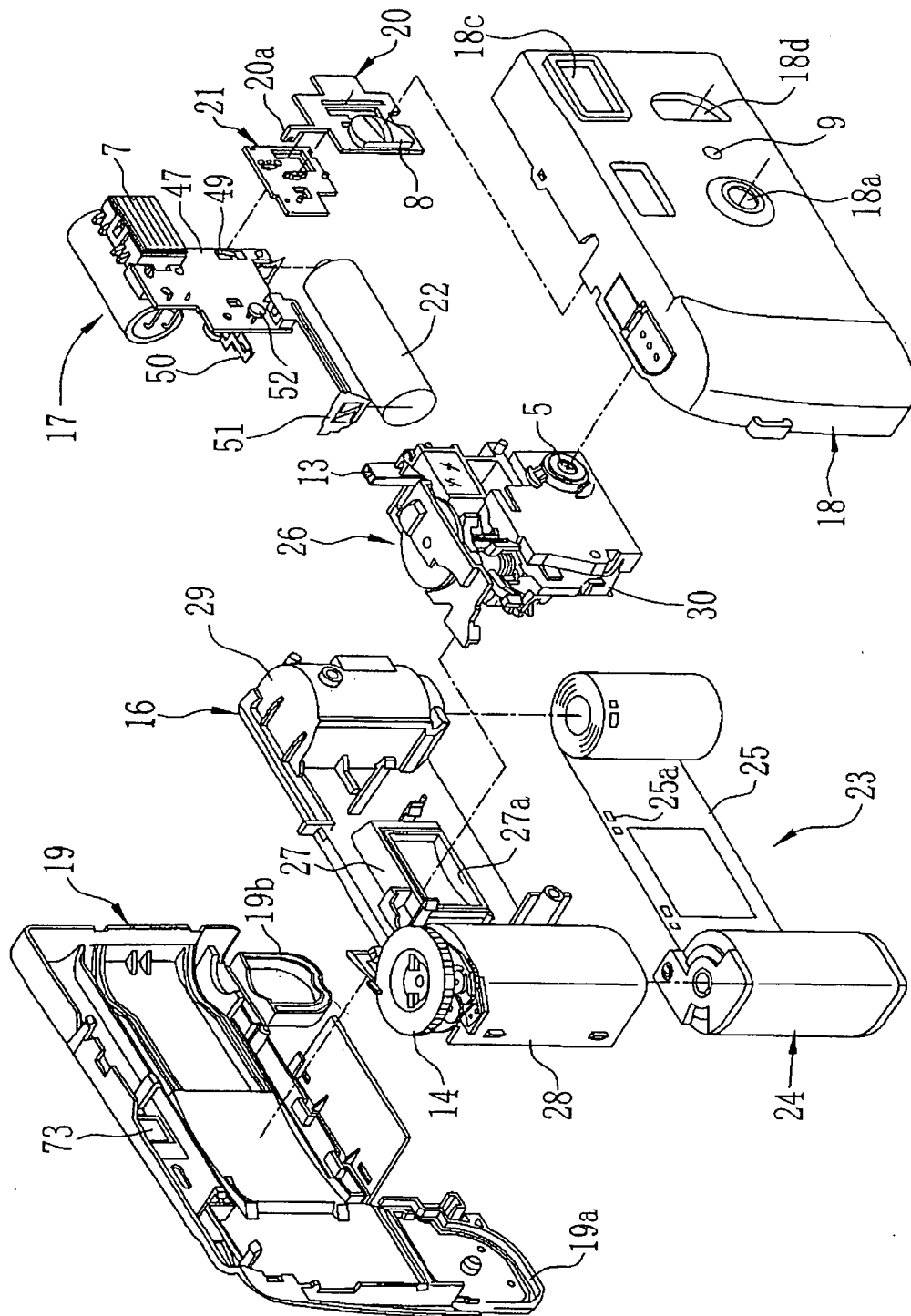
- 2 lens-fitted film unit
- 3 unit body 
- 7 strobe emitting part
- 9 photometric window
- 26 Exposing unit
- 31 photographing opening
- 33 shutter blade
- 38 large diaphragm aperture
- 41 diaphragm plate
- 42 small diaphragm aperture
- 46 electromagnet
- 52 photometric element
- 54 AE circuit
- 55 photometric switch

【書類名】DOCUMENT
NAME 図面 DRAWING

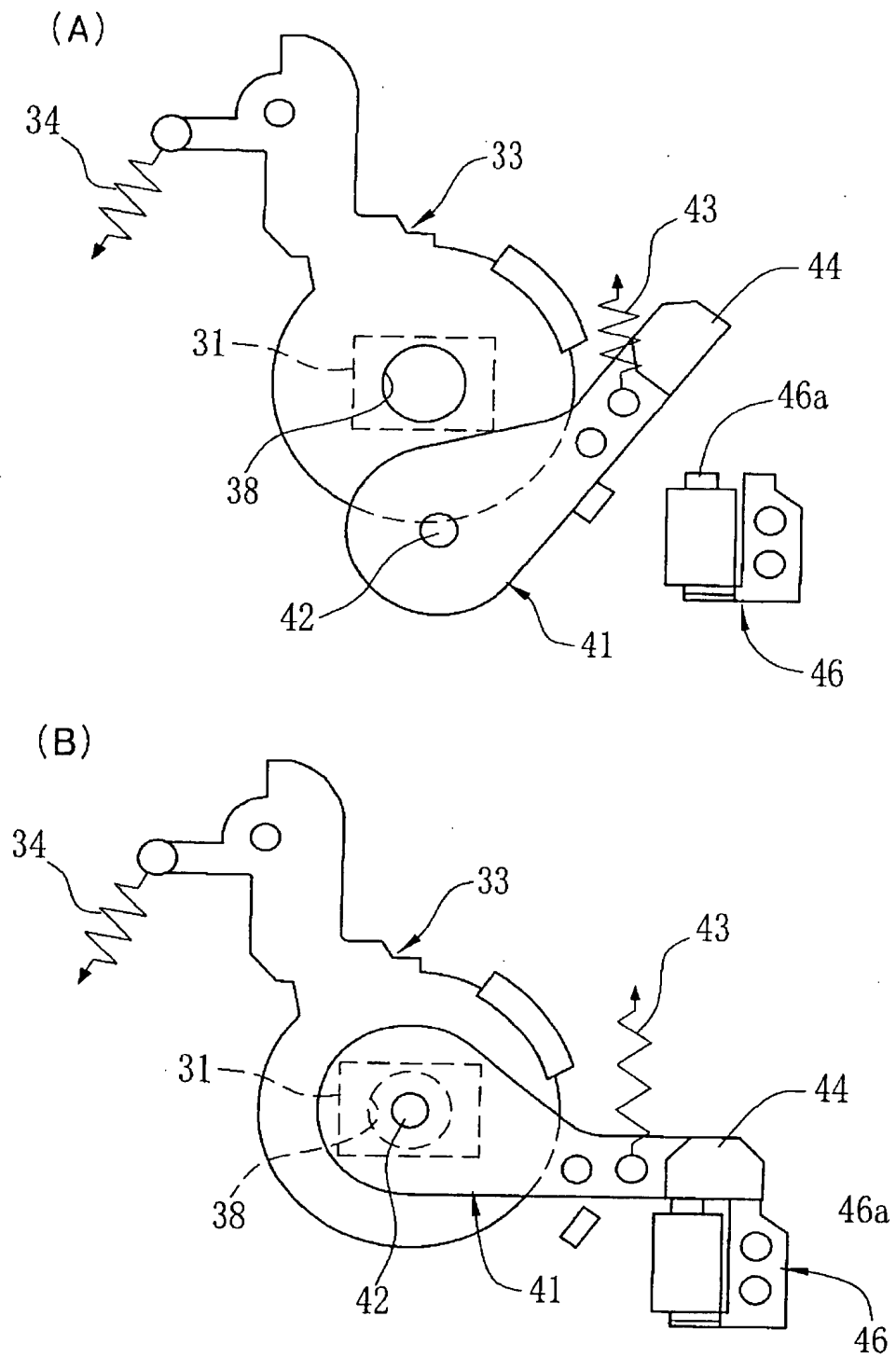
【図1】 FIG. 1



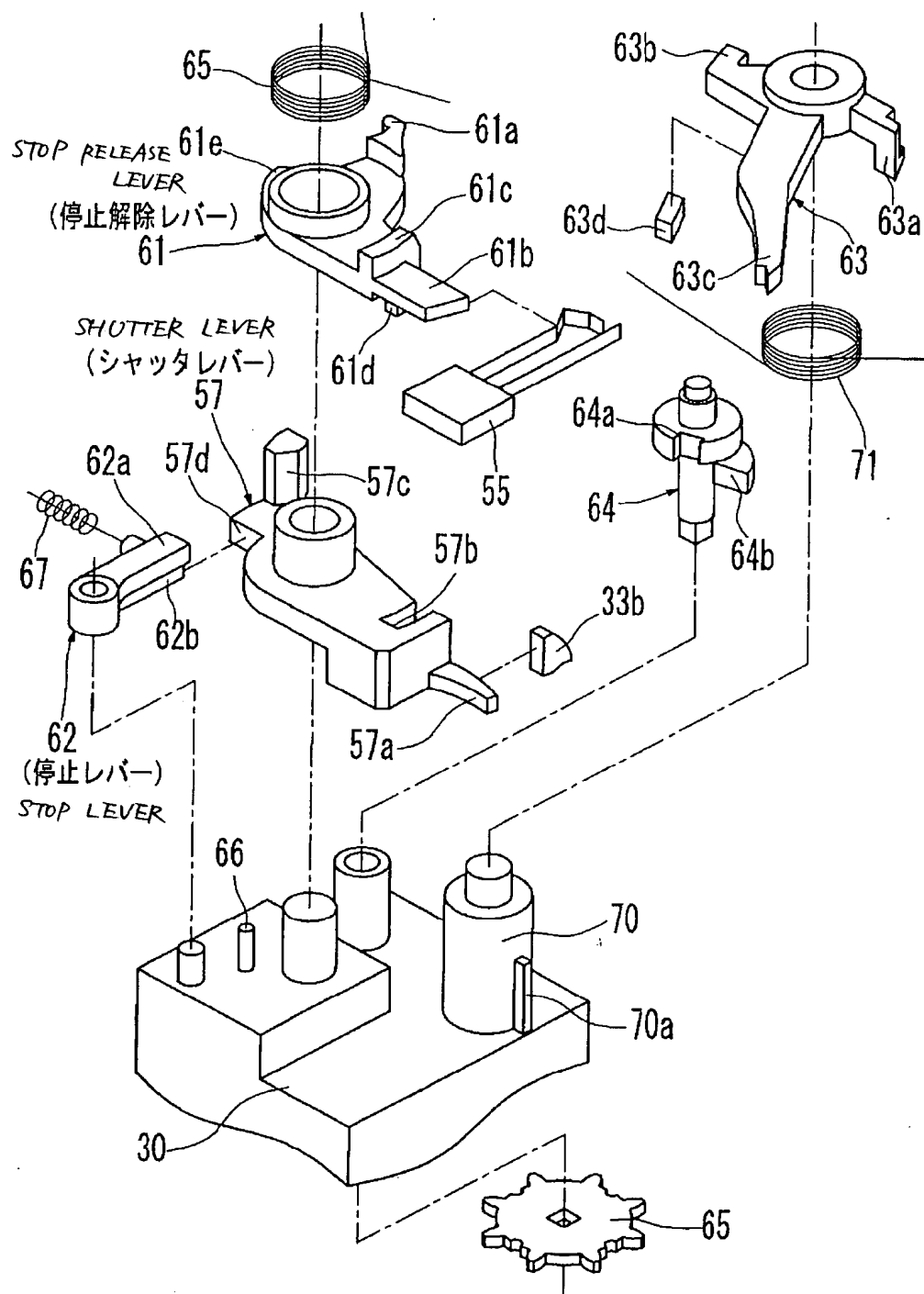
【図2】 F=G.2



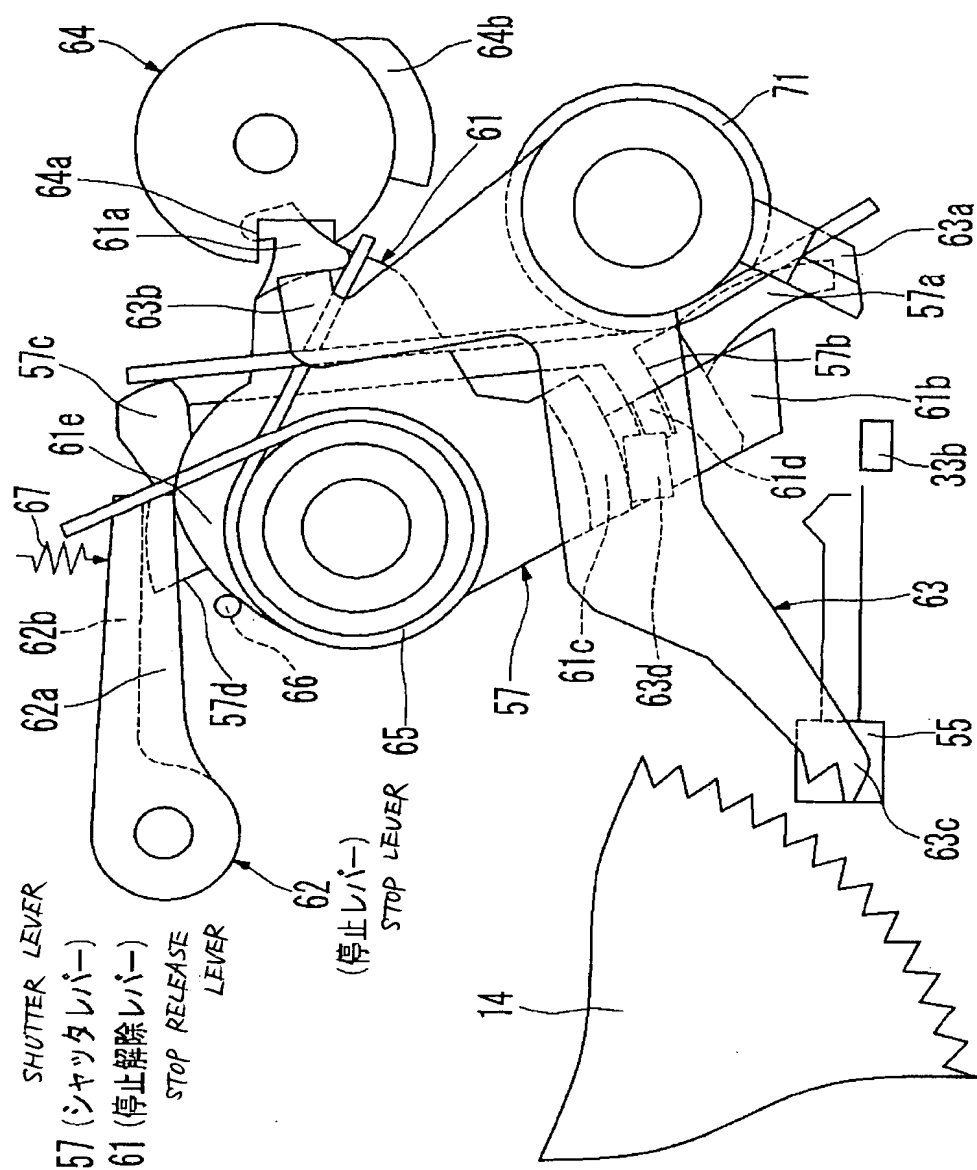
【図 4】 FIG. 4



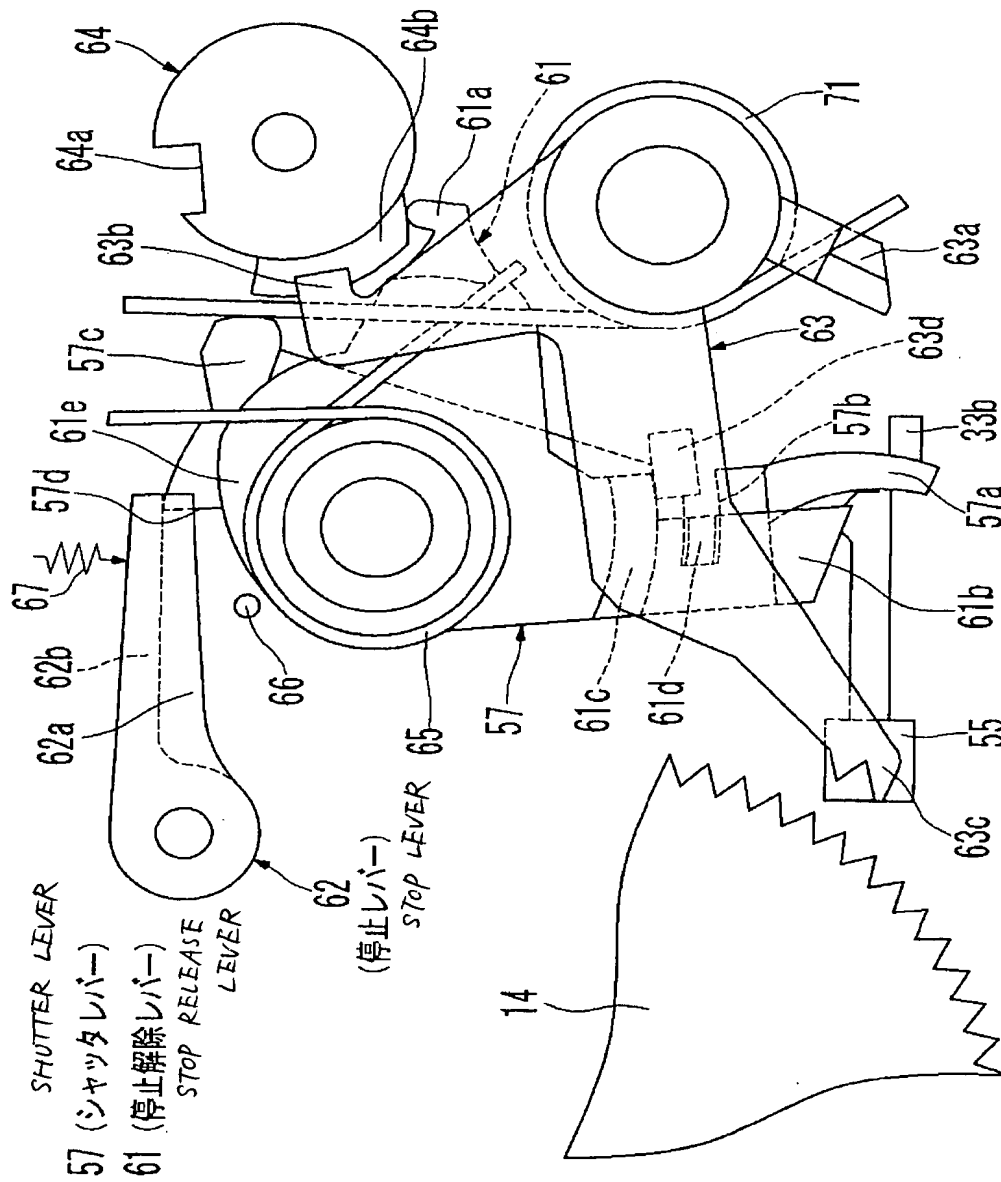
【図 5】 FIG. 5



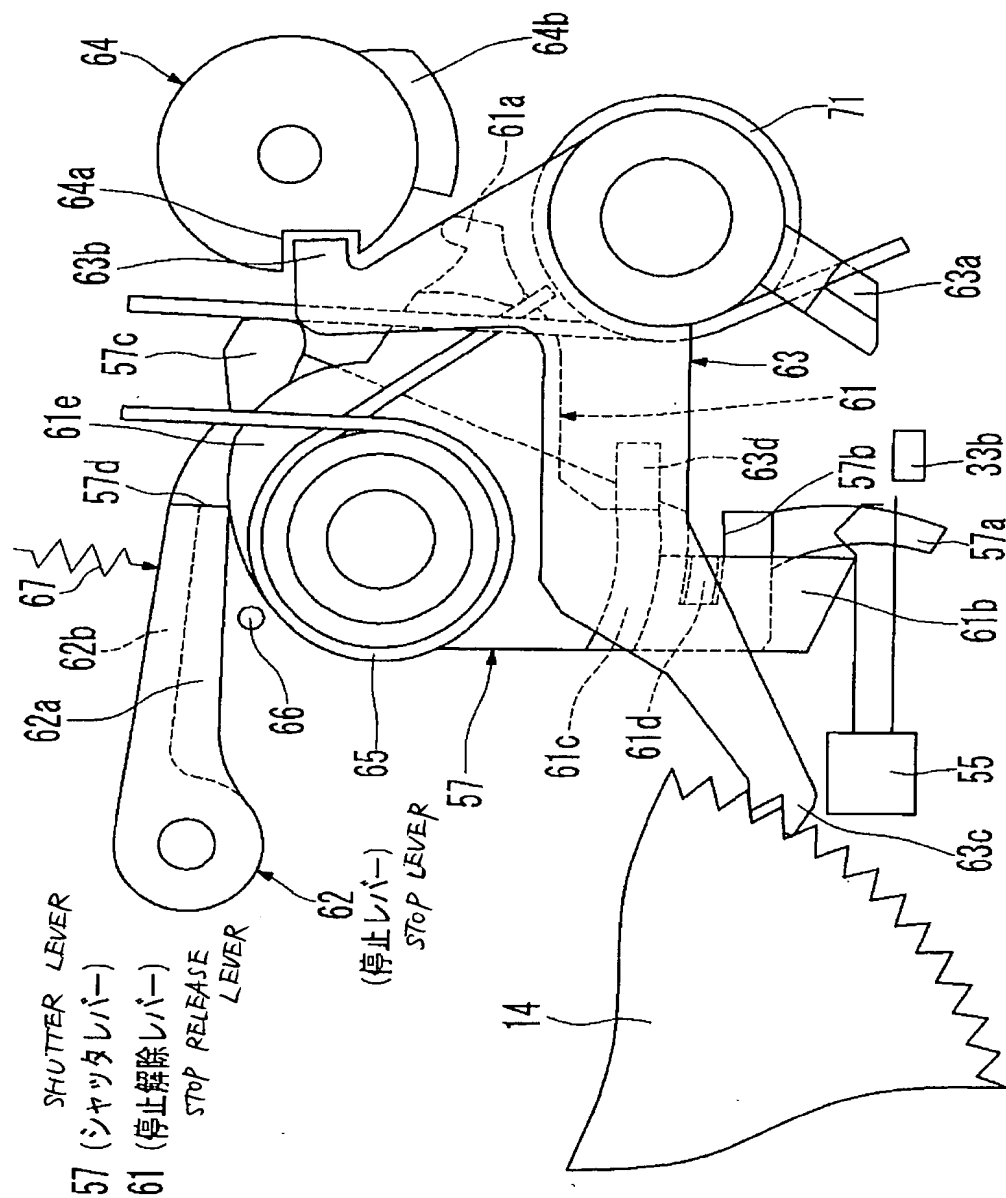
【図6】 FIG. 6



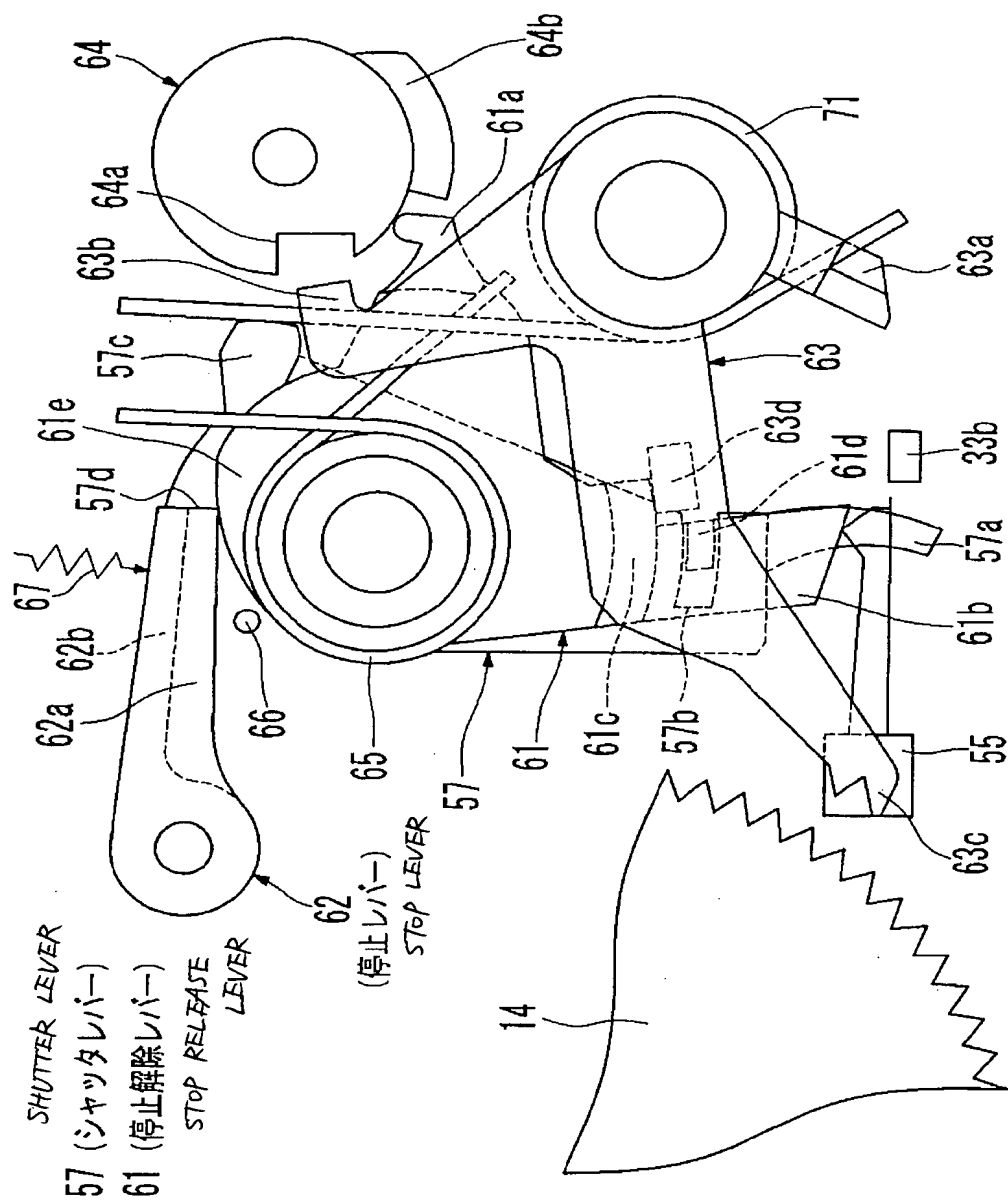
【図7】 FzG.7



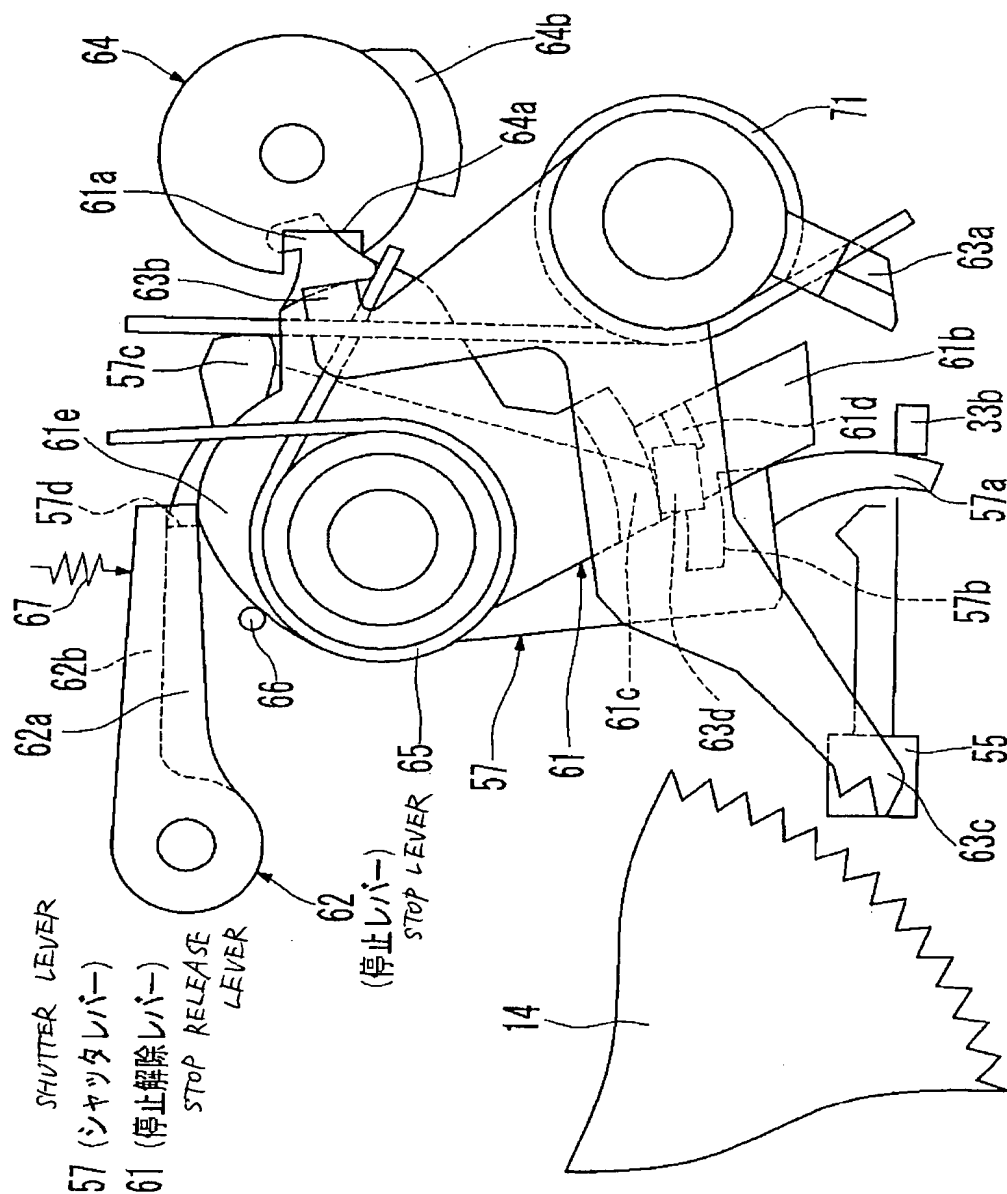
【図 8】 $F_{\pm G.8}$



【図 9】 F=Q. 9



【図 10】 FIG. 10



[TITLE OF DOCUMENT] Abstract

[ABSTRACT]

[OBJECT] Preventing a lens-fitted film unit capable to photograph appropriately under a variety of photographing conditions.

[RESOLUTION] When a photometric switch 55 mounted in a shutter mechanism is turned on by a pressed shutter button, an AE circuit 54 measures a subject luminance by a photometric element 52. If the subject luminance is low, photographing is executed through a large diaphragm aperture 38, and if the subject luminance is low, electric current is flown to an electromagnet 46 to swing a diaphragm plate 41 and insert a small diaphragm aperture 42 into a photograph optical axis. A diaphragm value, shutter speed, and film sensitivity as released and small diaphragm are determined to fulfill the following conditional expression:

Released: $6 \leq AV+TV-SV+5 < 11.5$

Small Diaphragm: $10.5 \leq AV+TV-SV+5 \leq 15$

[ELECTED FIGURE] Figure 3